

Lindenmuth
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STOCK TAKING IN FIRE CONTROL MANAGEMENT



**TOPIC I PRESENTED AT
FIRE CONTROL CONFERENCE**

**OGDEN, UTAH
FEBRUARY 15 to 20, 1954**

**CLARE W. HENDEE, REGIONAL FORESTER, R-5
TASK FORCE LEADER FOR TOPIC I**

Symon R-1 + Nelson R-5 pointed out that some years
they man below and some seasons about Form X, which
sets 71 manpower on duty by BT, but describes
differences between seasons.

I.C.1 - Why weren't lockouts manned?

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CLARE W. HENDEE, REGIONAL FORESTER, R-5, TASK FORCE LEADER

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California Experiment Station

PROTECTION RESULTS
RESOURCE LOSSES AND THEIR OVERALL SIGNIFICANCE

By

M. M. Nelson, Chief,
Division of Fire Control, R-5

Presented at

FIRE CONTROL CONFERENCE
Ogden, Utah, February 1954

Topic I-A-1

PROTECTION RESULTS

RESOURCE LOSSES AND THEIR OVERALL SIGNIFICANCE

*data based
on NFE only*

To present the picture of resource losses on the national forests, we have prepared a series of graphs and charts. The first series of six charts illustrates the various resource losses for national forest land as a whole--for the entire United States. For the earlier years, beginning with 1906, resource losses are presented by varying periods. From 1906 to 1920, it is shown in 5-year periods; 1921 to 1927, it is shown as a separate period; 1928 to 1932 is shown as the 5-year period prior to the CCC program. The CCC period is shown as between 1933 and 1941. The more recent period from 1940 to 1952 has been plotted in a 3-year running average. This was done in order to better show the resource loss trend over a period of recent years. It is shown as a 3-year running average in order to take out extreme peaks and dips in the curve and better illustrate the trend. After all, it is the trend that seems most important to be concerned with at this time.

Chart No. 1 illustrates the volume of timber burned on national forest lands since the beginning of Forest Service protection. It will be noted in the early history of the Forest Service there were tremendous losses of timber from fire. The period of 1906-1910 showed an average annual loss of 1.4 billion board feet. Another high period was that between 1916 and 1920. The chart further illustrates that, as protection was strengthened, the loss in volume of timber was greatly reduced. A discouraging thing is to look at the right side of the chart and note the upward trend in loss of timber during the past few years. Some may argue that the overall significance of this is not great inasmuch as we are now in a better position to salvage fire-killed timber than we have ever been before in the history of the Forest Service. Experience in Region 5 in the past few years has indicated that as much as 80% of the fire-killed, merchantable timber has been salvaged following the fire. We should not overlook the fact, however, that large volume losses of commercial timber in any one year, in any one working circle, can have serious effect upon the management plan for that working circle and the stability of the dependent community.

The next three charts illustrate our resource losses in terms of area burned. Chart No. 2 shows the average annual area of commercial forest land burned. Here again, the early records of Forest Service protection have shown a desirable downward trend; but again, a disturbing point is that in the past few years this trend has again shot upward.

The next chart (No. 3) shows the average annual burn of young-growth forests. This chart, it seems to me, carries a considerable amount

of significance in that loss of young-growth can have a very serious impact upon the management of a working circle. In a managed forest, a high percentage of the allowable cut is based upon growth put on annually by young-growth stands of timber. A fire which kills a young-growth stand of timber up to 40 or 60 years of age leaves very little to be salvaged. Furthermore, most of these stands are at an age where their increment is very significant to the overall management plan. In an overall plan for protection of forest land, it is possible that we should be giving more consideration to protection of stands of young-growth than we are doing at the present time, based upon their great importance in a managed forest. Although the record over the years shows a very desirable trend in the loss of young-growth forests, it is again disturbing to note that that trend is now upward rather than downward.

The importance of national forest land from a water-producing standpoint has increased over the years that the national forests have been in existence. With the trend of heavy population movement to the west, the importance of our national forest watersheds becomes greater. Because of this, the importance of protection from fire of watershed lands becomes greater and greater.

Chart No. 4 illustrates the average annual burn on non-commercial forest lands--primarily our watershed lands. As in other resource losses, protection of national forest watershed lands has shown an improvement over the years; but here again, we find that the trend in the last few years has taken a turn for the worse. This at the same time that the values of such watershed cover are increased.

During the past few years, while the dollar value has been decreasing and the market value of property has materially increased, all of us have had to face our insurance agent with the need for increasing the amount of coverage that we have for our property. This, of course, has increased the premium we have had to pay. In addition to this, we have had our taxes increased in order that the local fire department could give us the same or better protection than we have had in the past. Making a comparison with the national forests, we find that the value of these publicly owned forests has increased tremendously. The average selling value of national forest stumpage in Region 5, for example, has increased from \$1.95 per thousand in 1940 up to \$17.15 per thousand in 1953, an increase of about 880%. Every tree growing on a national forest has an increased value. At the same time every acre of watershed land also has increased in value. Carrying the analogy further, John Q. Public pays an insurance premium on his valuable public property. The insurance premium that he pays is that which is expended for protection from fire of his forest property. Now, it is not part of my assignment to indicate the value of public property being protected, but the increased value will be apparent by looking at the trend in damages to this public property.

The damages are shown in two charts (Nos. 5 and 6). The first shows the damage in dollars to the timber resources on the national forest lands due to fire. The second shows the same thing for the non-timber resources. The dollar value of damages is shown as it was reported during the year when the damage occurred. From these two charts, it will be noted that at no time in the history of the Forest Service has the damages from fire, measured in values lost, been greater than it is at present. Looking at that part of the chart from 1940 to 1952, we find that the 3-year running average shows a low for the period 1940 to 1942 of a little over \$800,000 total damage. For the 3-year periods, 1949 to 1951 and 1950 to 1952, total damages have been just under \$7,000,000. These damages, measured dollar-wise, are greater than the historical bad fire period of 1906 to 1910 when the national forests had virtually no protection. Please keep in mind that all of the charts shown are for national forest land only.

It would seem to me that these two charts showing resource damages should be given careful consideration in determining the adequacies of any protection program.

RESOURCE LOSSES BY REGIONS

The second phase of presenting the resource losses to you is that of showing in what part of the United States the resource losses are occurring, and the trend in each of these regions. This I have endeavored to do by preparing one chart for each region, on which I have tried to show the same information that has been shown on the national charts. There is one difference, however, in that the regional charts have been prepared only for the period 1940 to 1952 (the period since statistics have been available on the punch cards). I feel that this is satisfactory since what we are concerned with is our present trend in protection rather than the history of past decades.

As with the national picture presented, the period between 1940 and 1952 is shown in a 3-year running average. The same scale is used on the charts for each region in order that the resource losses can be compared region-by-region more readily. Each of these charts has three figures. The bar graph at the bottom shows the area of both non-commercial and commercial timberland which has burned. Within the bar for commercial timberland burned is also shown the area of young-growth which has burned during each period. The graph at the top of the chart (shown as Figure 1) is a presentation of damages, expressed in dollars, both in timber resource and non-timber resources. The inserted bar graph (Figure 3) shows the resource losses in terms of timber volume lost.

It will be noted from a study of these charts that the heavy timber damages are occurring in Regions 5 and 6. The heavy losses in non-commercial timberland burned over are primarily in the Western Regions, with Region 5 having the greatest losses in this regard. When we come to the subject of commercial timberland losses and acres of young-growth lost, such regions as 8 and 9 have had heavy losses as well as Region 5. Region 3 also is showing up in the picture with an upward trend of resource losses from fire.

LOSSES BY MANAGEMENT UNITS

Another method of showing resource loss is to express the loss in percentage of area burned. A commonly used figure is an allowable burn of one tenth of one percent. I have purposely not shown a chart for the Service as a whole expressed in percent of burn. I think it would be extremely dangerous to show losses or progress in such a manner. It would give the wrong picture. Trees which are saved in the White Mountains of New Hampshire by burning less than the allowable burn certainly are not available to help stabilize the communities of Alturas or Susanville in California, where the allowable burn may be exceeded by a great margin.

Allowable burn figures were set up by considering what any management unit might annually sustain without seriously upsetting the management. We should continue to use this measure, management unit by management unit, and not for the Service as a whole or a region as a whole.

When a national forest is used as a management unit, the chance of showing a wrong picture is lessened; but the proper way would be to consider it by working circles, watersheds, or other such management units.

Statistics are not readily available to show the picture of the number of true management units where resources losses are within or outside of an allowable burn. The following may, however, be of interest to this group:

Gustafson recently made an analysis which shows that 35 national forests in our entire system accounted for 74% of the damage to resources. This was for the period 1947-1951. The same 35 forests were the "bad boys" for the period 1942-1944 when they accounted for 79% of the total resource damages.

Ex-Regional Forester Show recently studied California fires for a 30-year period, 1921 to 1950. He found that as a group the 14 Northern California forests held burn to allowable only six times. As a group the 4 Southern California forests met objectives only once in the 30 years. Using the individual national forest and the year

as a unit, and for the same 30-year period, in Northern California the burn has been held to allowable in 172 out of 390 cases; in Southern California objective was met in only 76 out of 120 cases.

It is not necessary to tell you that 16 of California's 18 national forests qualify as belonging to Gustafson's 35 "bad boys". In fact, when we leave R-5's two "good boys" (Eldorado and Inyo) out of the picture, we find that the remaining forests hold burned area to an acceptable allowable only about one half the time--242 out of 450 cases.

This is a discouraging set of statistics to view at a time when national forests' resources are of such tremendous importance to the nation as a whole.

SUMMARY

To summarize, we might point out the following: National forest lands experienced terrific losses in resources during the early history of the Forest Service. Through increased protection, these overall losses were brought down as it was possible to give better protection. The alarming thing that is pointed out in this analysis is that during the past few years the trend in resource losses is going upward rather than continuing downward as it should. For each of the presentations showing resource losses, this upward trend has appeared in the past few years. It has been so great that it shows up in the overall national figures in spite of the fact, as we all know, that the law of averages always has the effect of leveling out bad losses in any one region during any one year. When values of the properties that are being destroyed are considered, the upward trend in losses is even more staggering and significant.

I will complete this presentation with this sobering thought. Based on the present trends in resource losses, the Forest Service is not now doing an adequate job of protecting the nation's valuable national forest resources from their ever-present enemy FIRE.

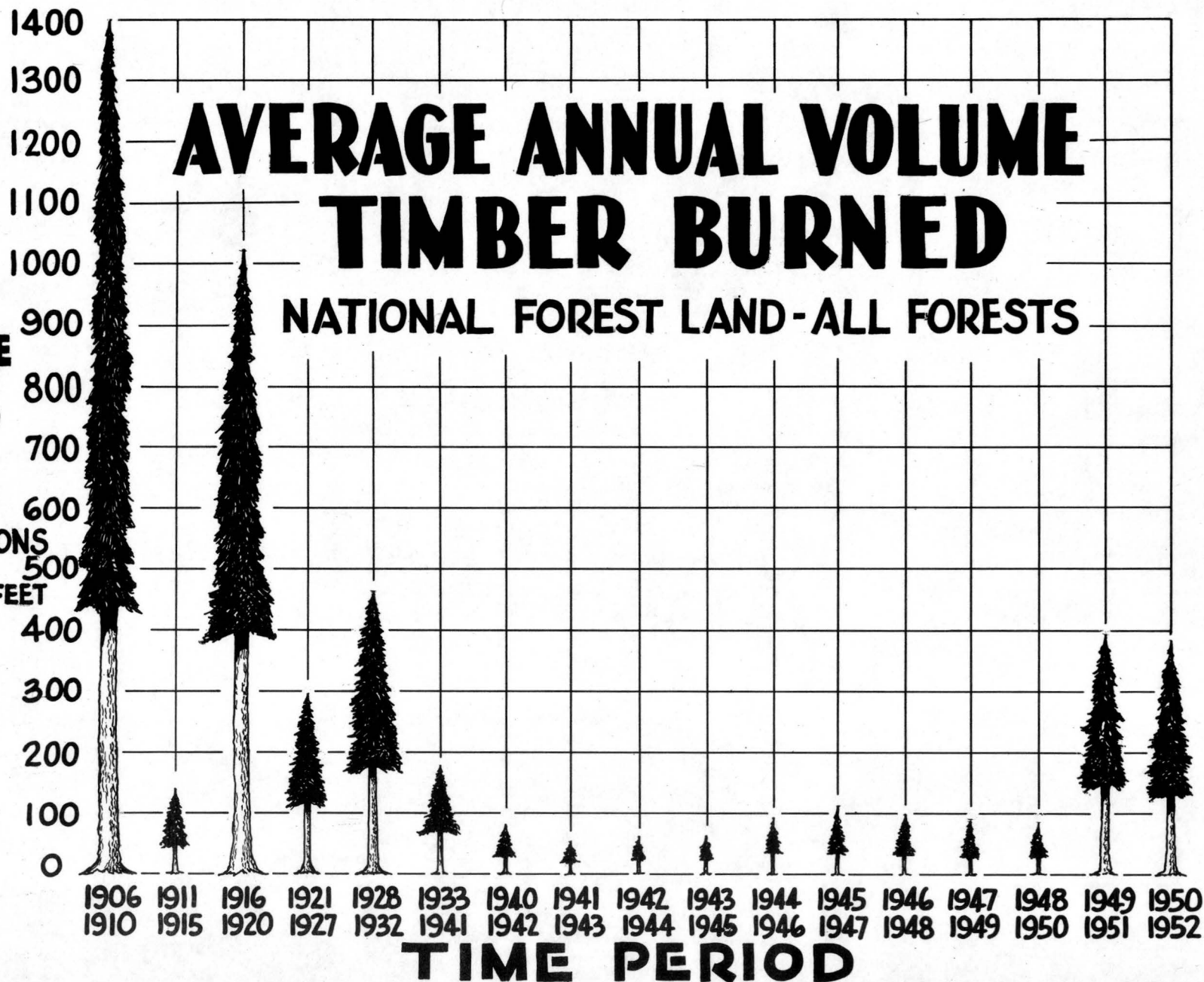
AVERAGE ANNUAL VOLUME TIMBER BURNED

NATIONAL FOREST LAND - ALL FORESTS

VOLUME
KILLED

IN MILLIONS
BOARD FEET

I-A-1 - Chart 1

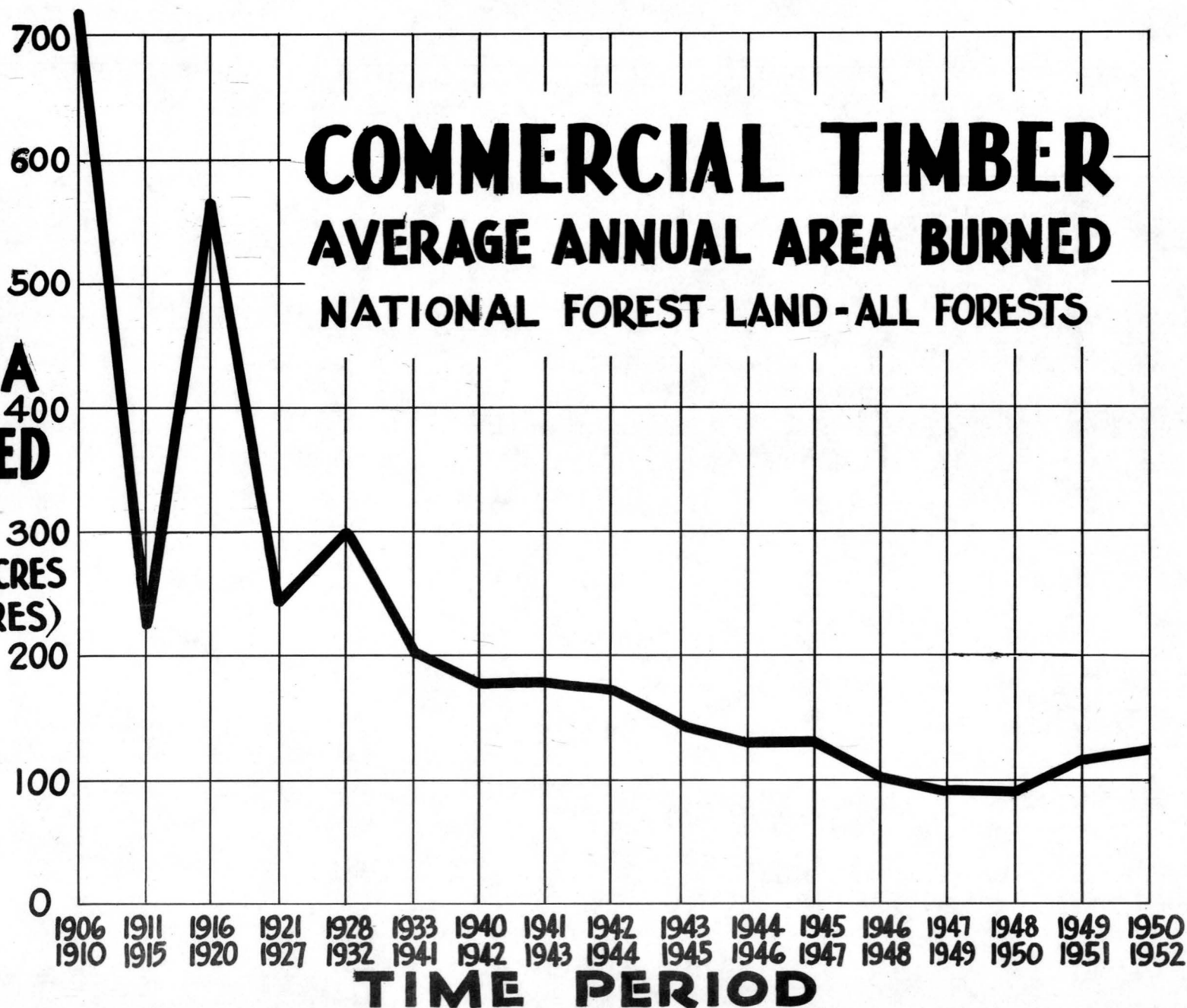


COMMERCIAL TIMBER

AVERAGE ANNUAL AREA BURNED

NATIONAL FOREST LAND - ALL FORESTS

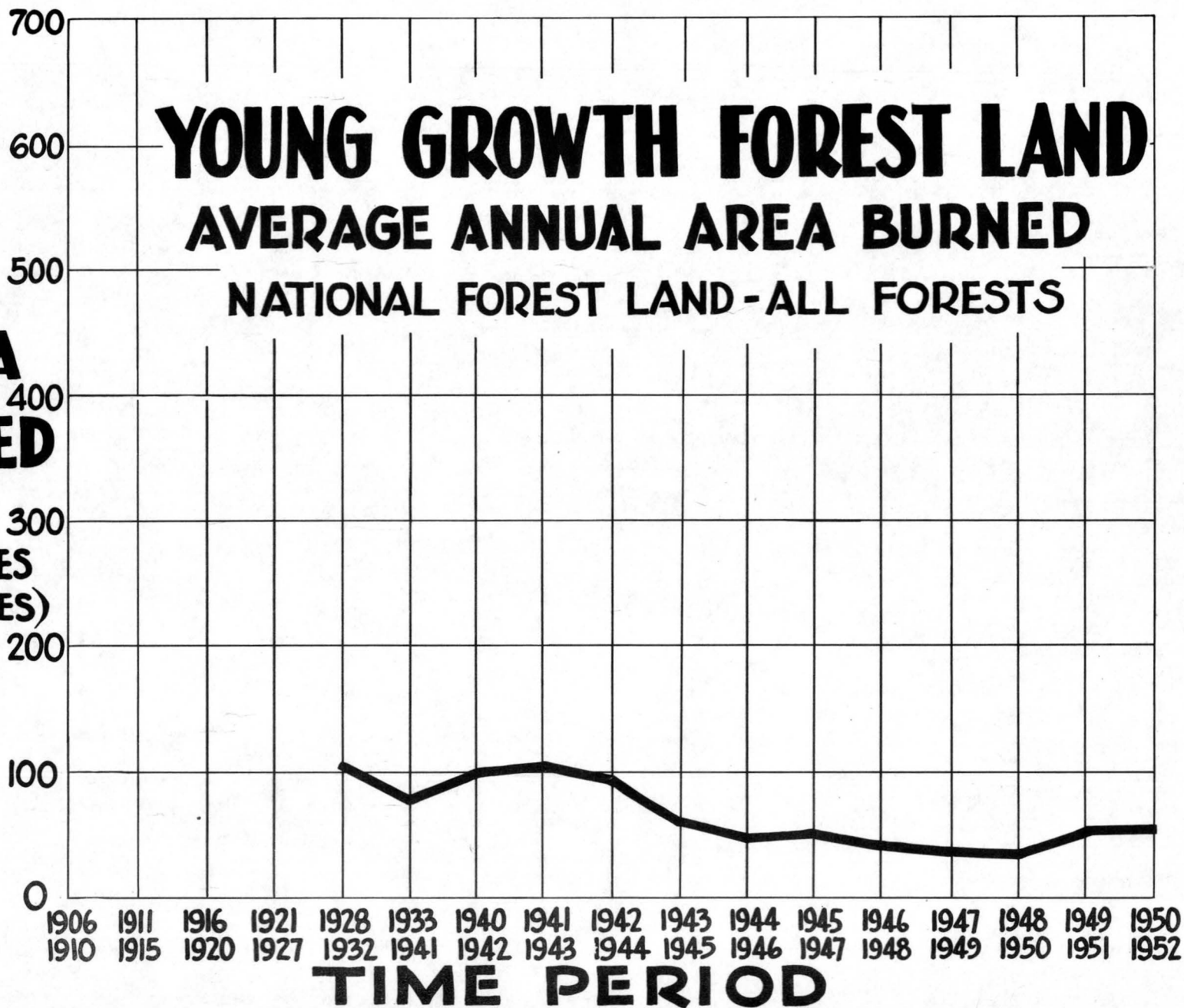
**AREA
BURNED**
IN M ACRES
(1000 ACRES)



AREA BURNED

IN M ACRES
(1000 ACRES)

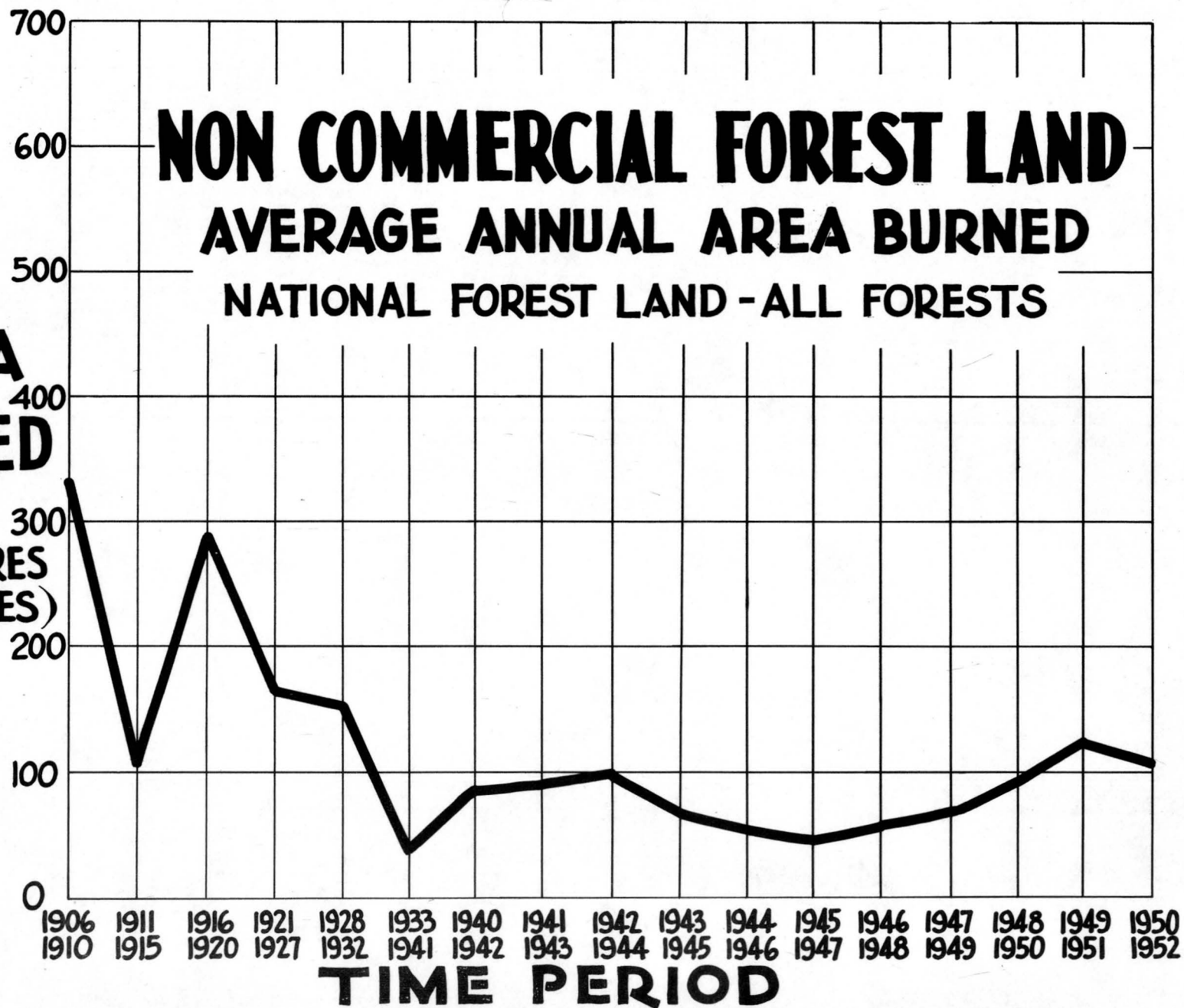
I-A-1 - Chart 3



**AREA
BURNED**

**IN M ACRES
(1000 ACRES)**

I-A-1-Chart 4

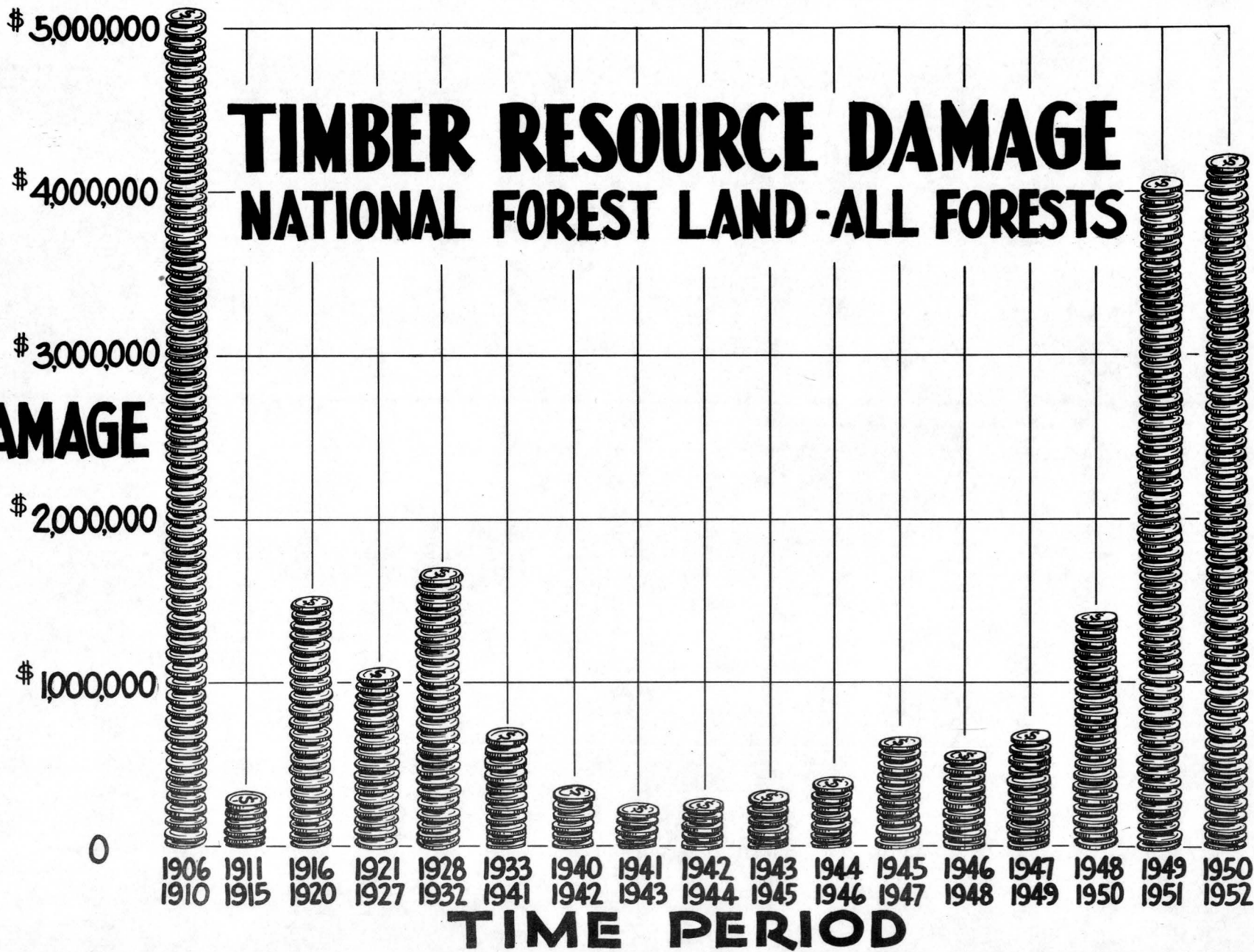


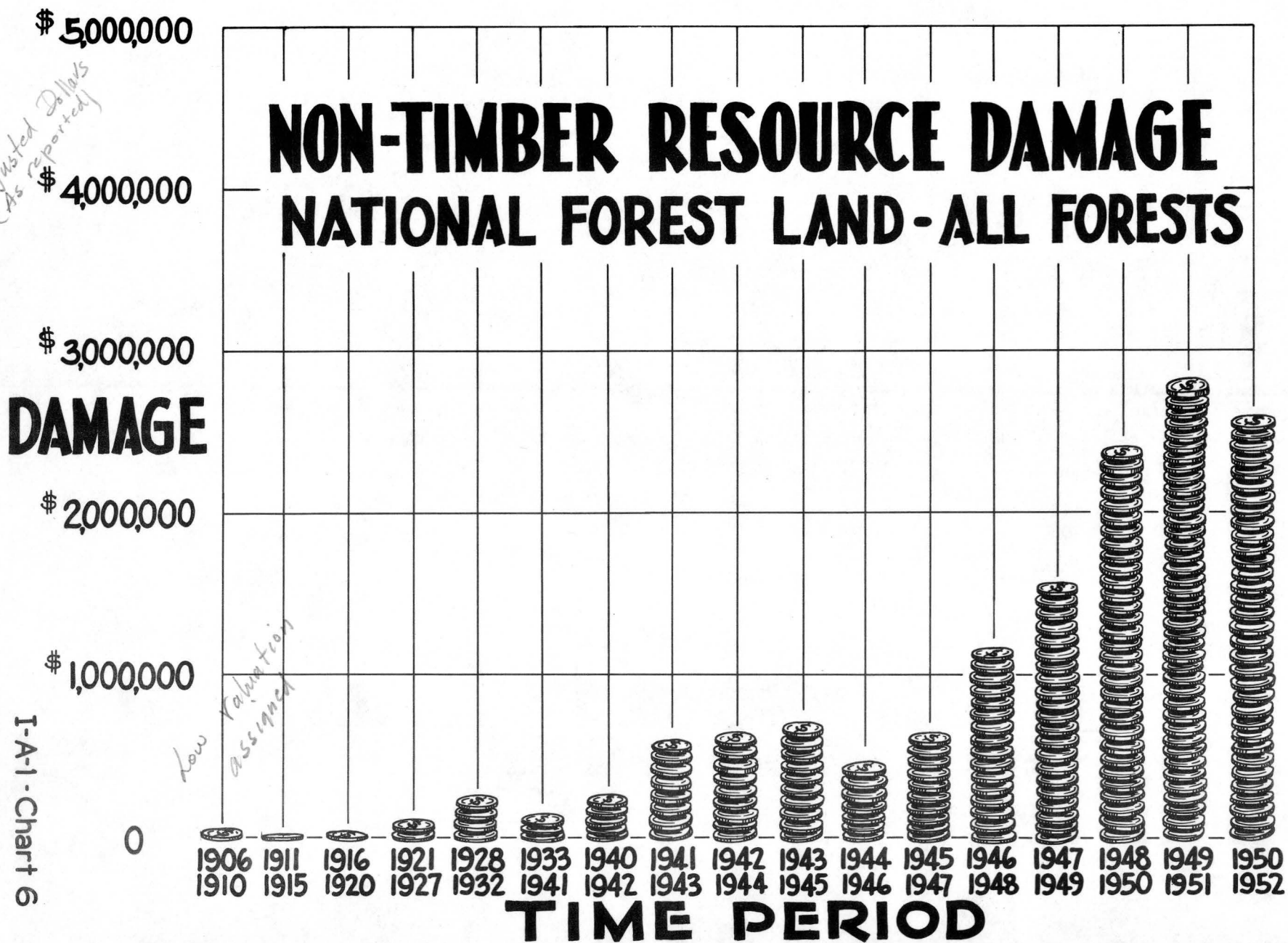
unadjusted Dollars
(as reported)

DAMAGE

I-A-1 - Chart 5

TIMBER RESOURCE DAMAGE NATIONAL FOREST LAND - ALL FORESTS





FIRE LOSSES - REGION 1

NATIONAL FOREST LANDS

1940-1952 BY 3 YEAR RUNNING AVERAGES

I-A-1 - Chart 7

VALUE OF RESOURCES LOST - M. DOLLARS

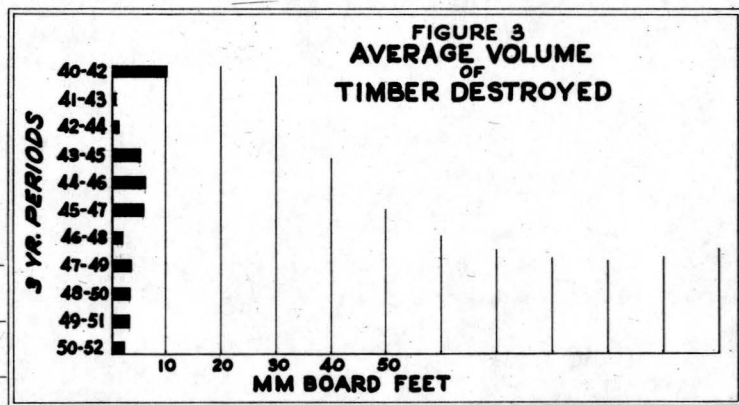


FIGURE 1
AVERAGE VALUE
OF
RESOURCES DESTROYED
TIMBER AND NON-TIMBER

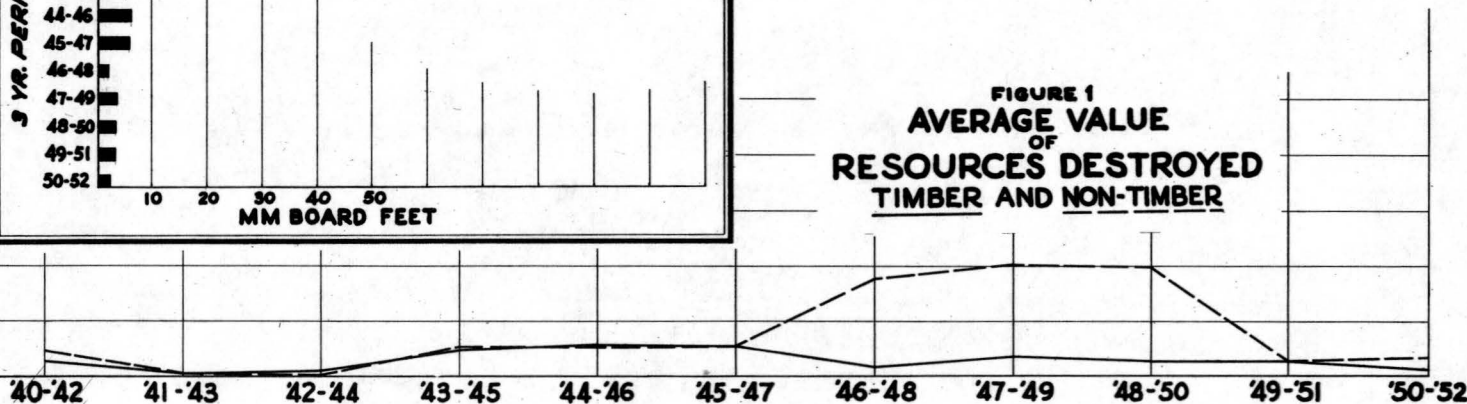
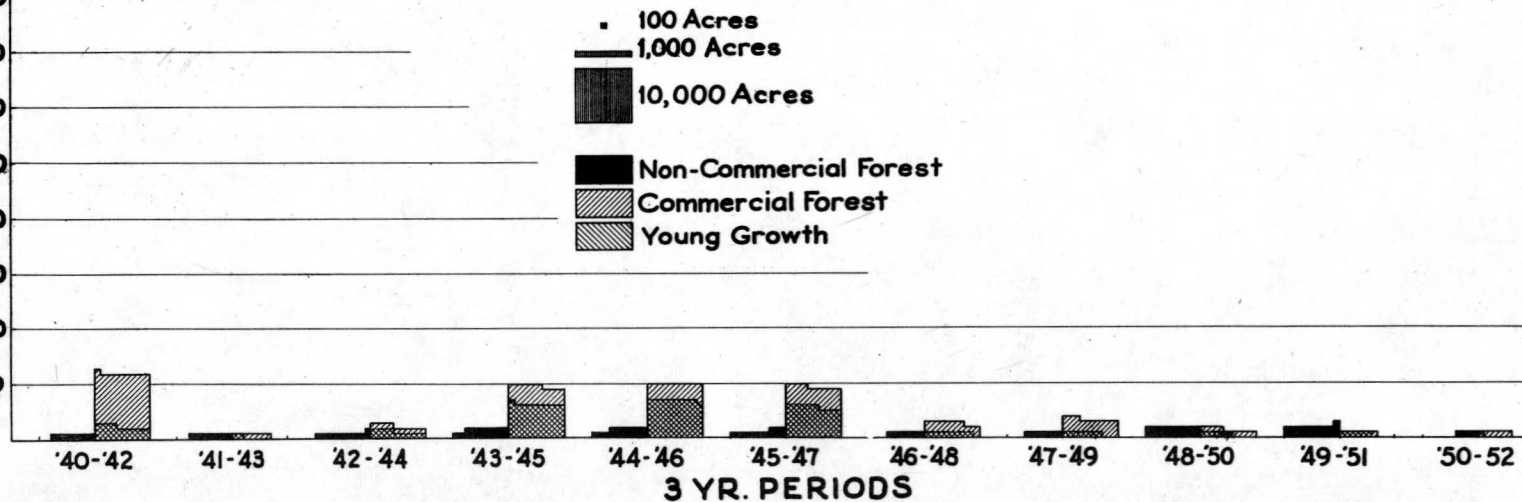


FIGURE 2
AVERAGE AREA BURNED

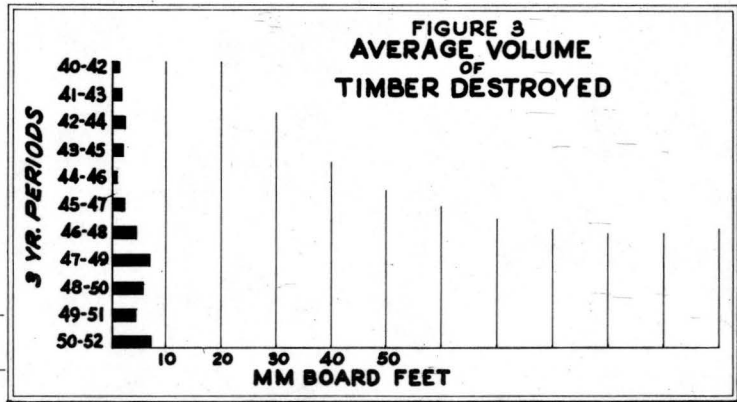
AVERAGE AREA BURNED - M. ACRES



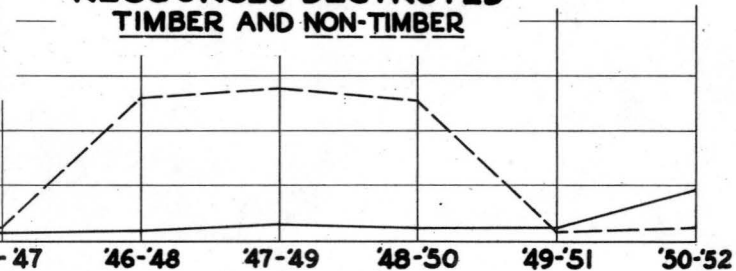
FIRE LOSSES - REGION 2 NATIONAL FOREST LANDS 1940-1952 BY 3 YEAR RUNNING AVERAGES

I-A-1 - Chart 8

VALUE OF RESOURCES LOST - M. DOLLARS

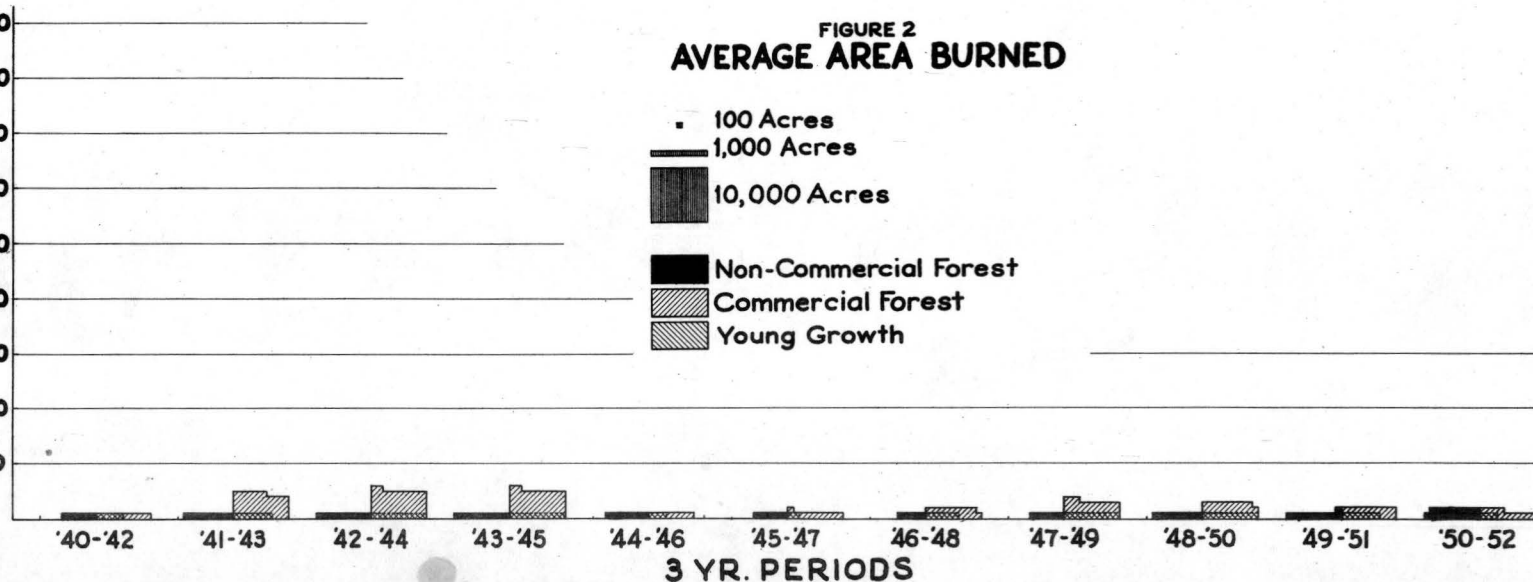
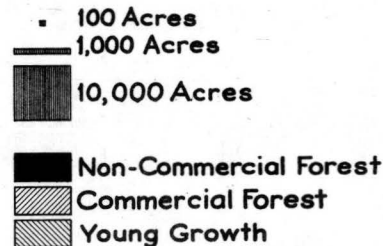


**FIGURE 1
AVERAGE VALUE
OF
RESOURCES DESTROYED
TIMBER AND NON-TIMBER**



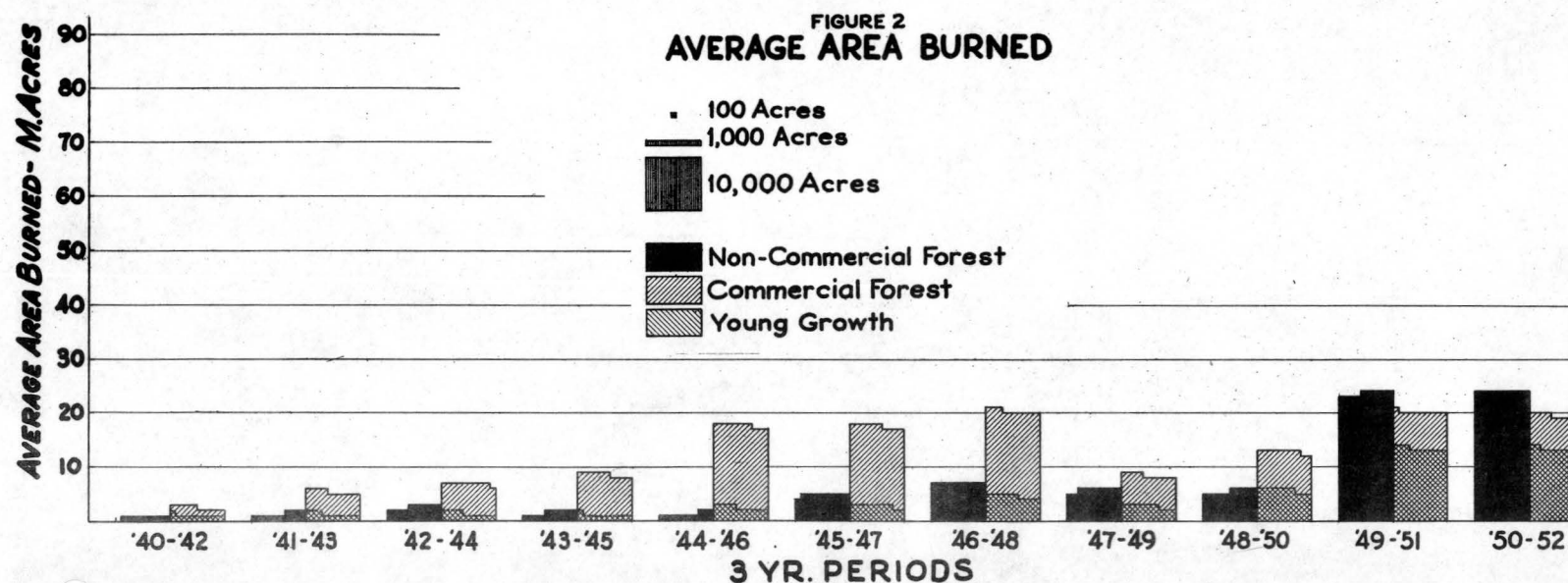
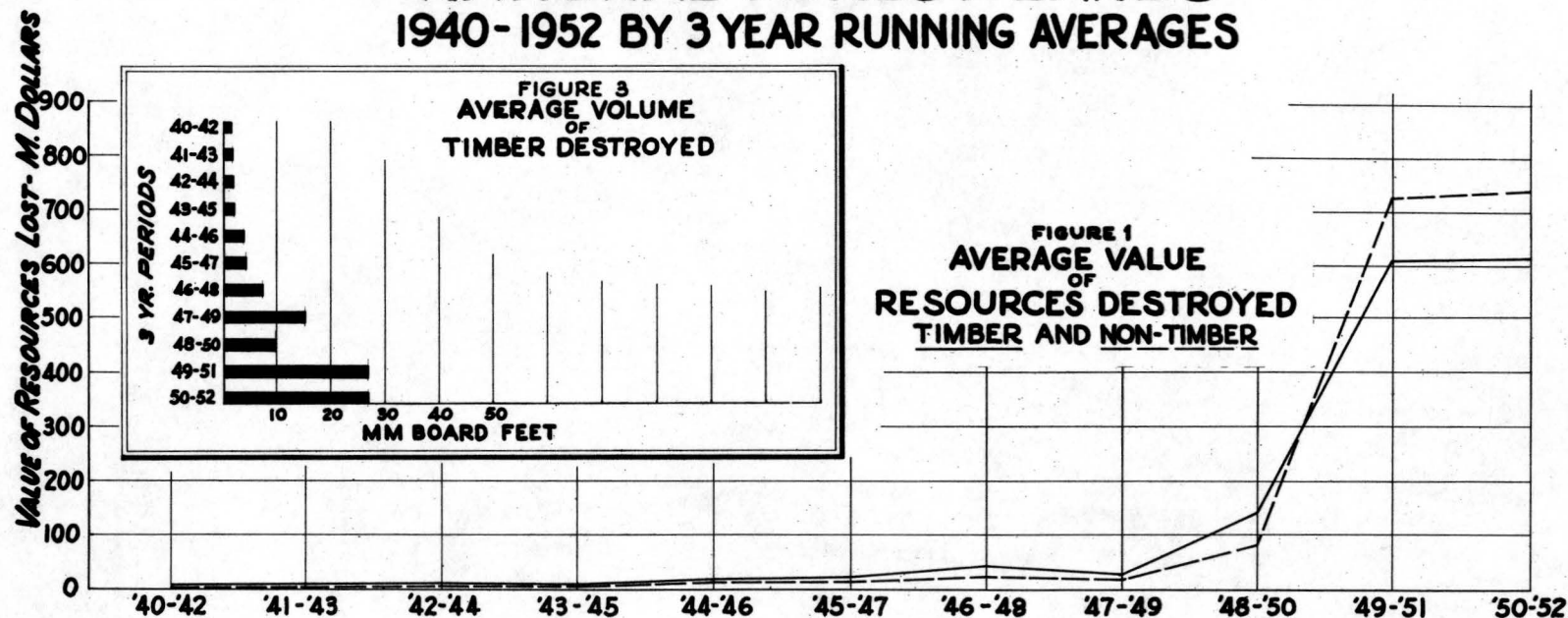
AVERAGE AREA BURNED - M. ACRES

**FIGURE 2
AVERAGE AREA BURNED**



FIRE LOSSES - REGION 3 NATIONAL FOREST LANDS 1940-1952 BY 3 YEAR RUNNING AVERAGES

I-A-1 - Chart 9



FIRE LOSSES - REGION 4 NATIONAL FOREST LANDS 1940-1952 BY 3 YEAR RUNNING AVERAGES

FIGURE 3
AVERAGE VOLUME
OF
TIMBER DESTROYED

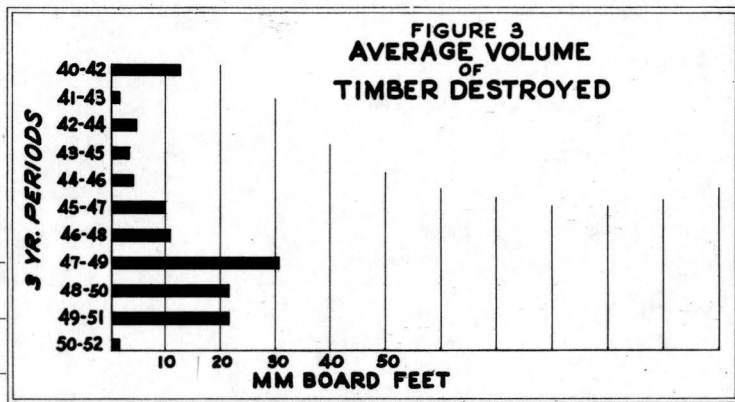


FIGURE 1
AVERAGE VALUE
OF
RESOURCES DESTROYED
TIMBER AND NON-TIMBER

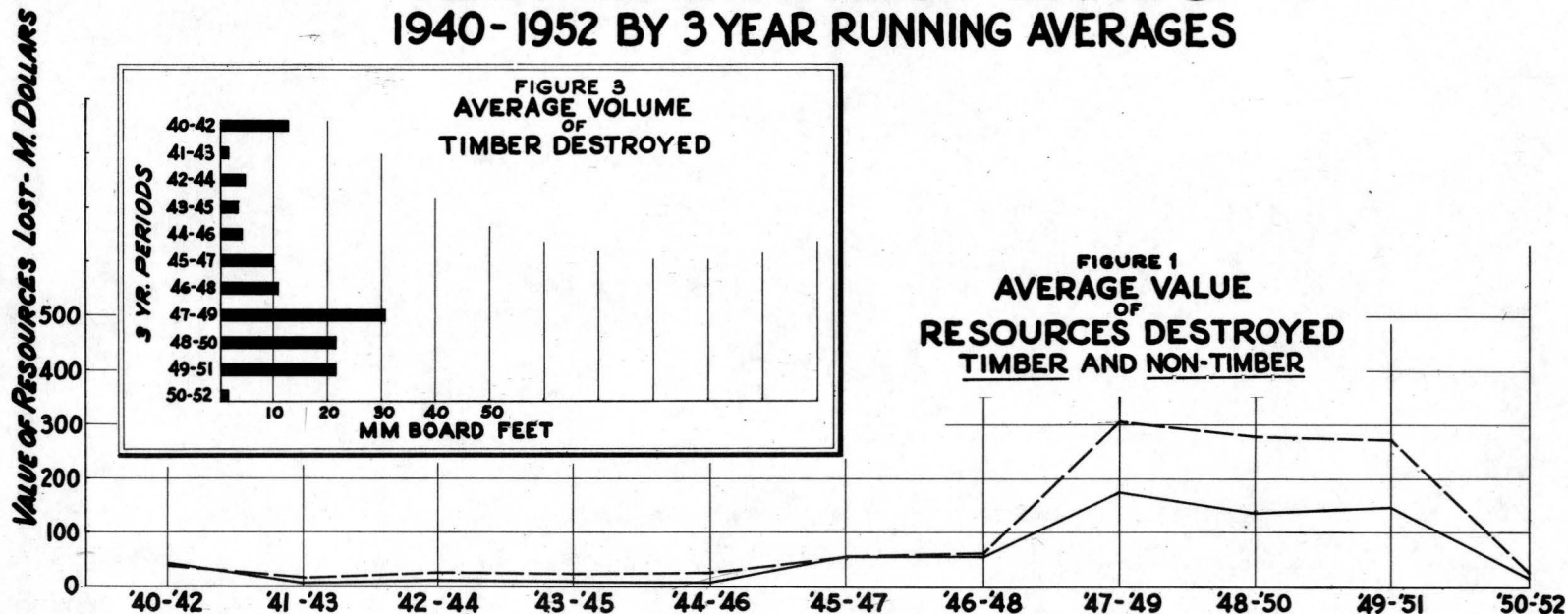
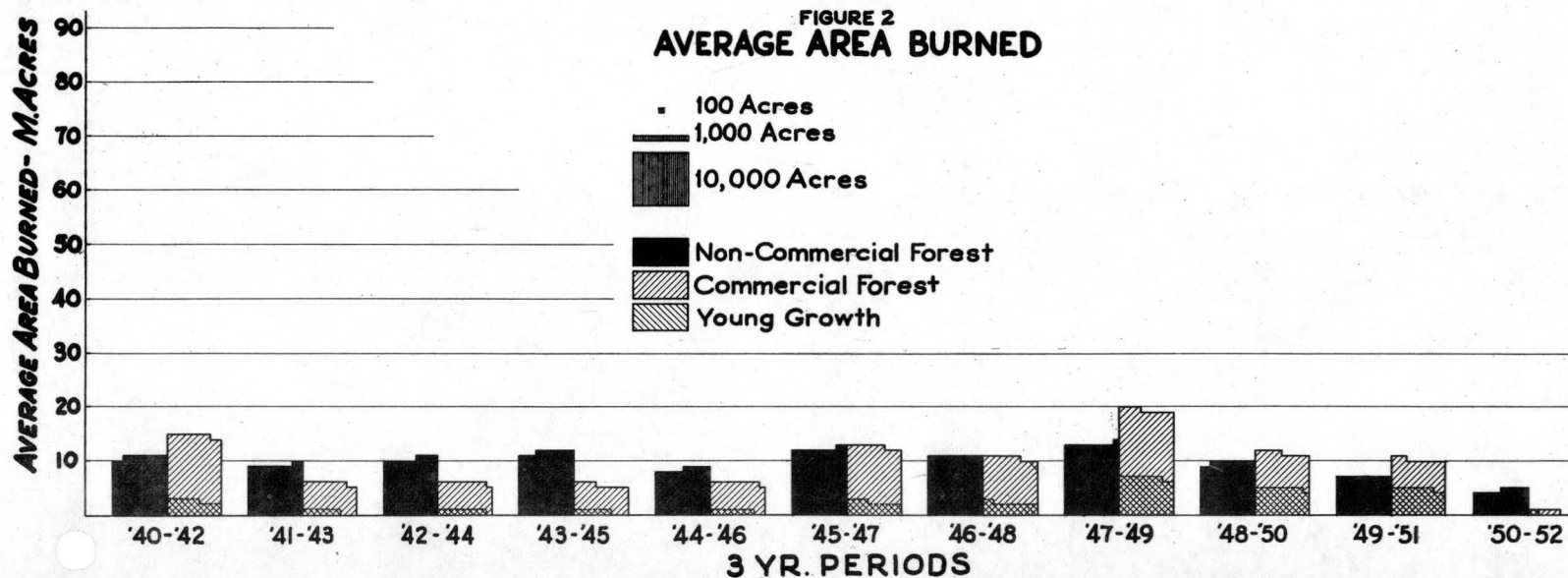
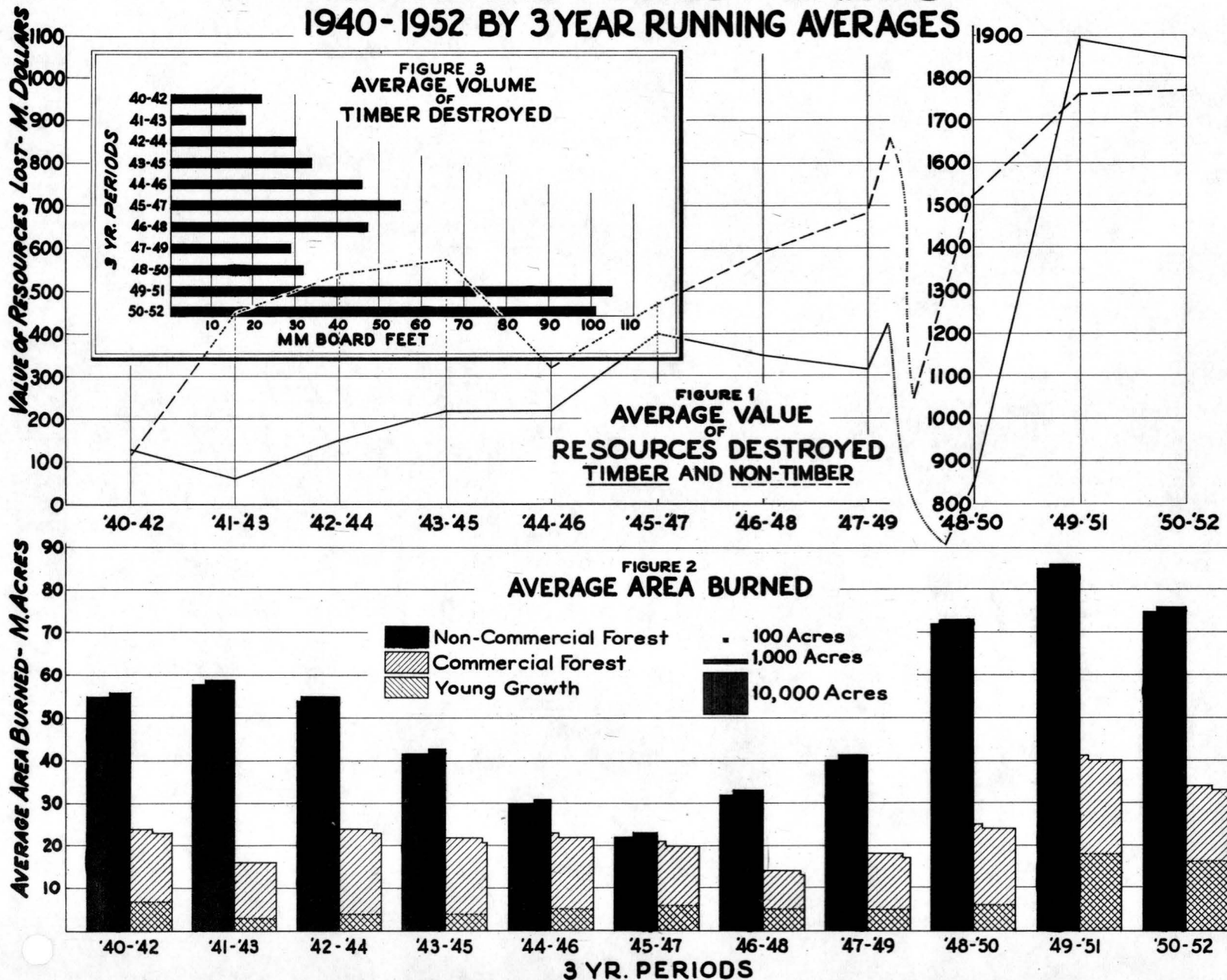


FIGURE 2
AVERAGE AREA BURNED



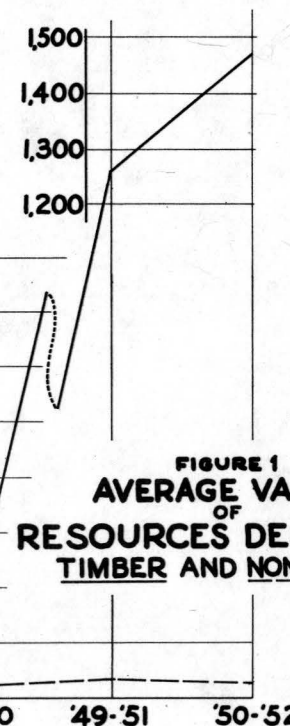
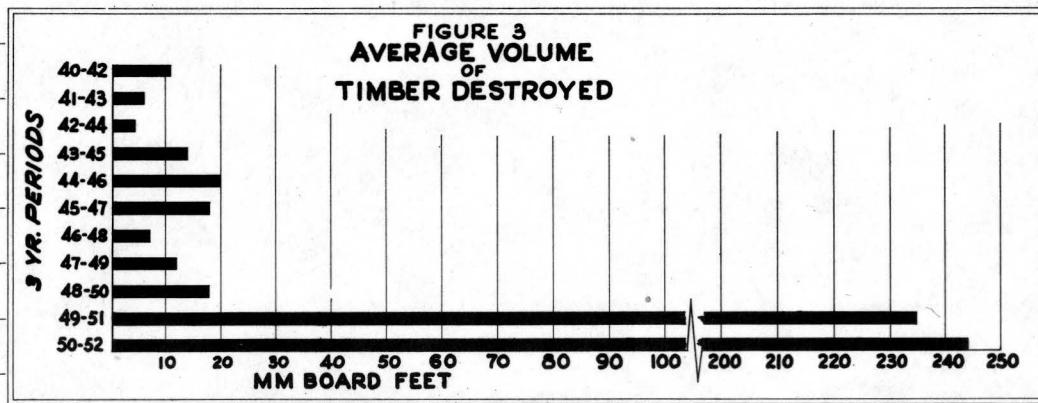
FIRE LOSSES - REGION 5 NATIONAL FOREST LANDS 1940-1952 BY 3 YEAR RUNNING AVERAGES



FIRE LOSSES - REGION 6 NATIONAL FOREST LANDS 1940-1952 BY 3 YEAR RUNNING AVERAGES

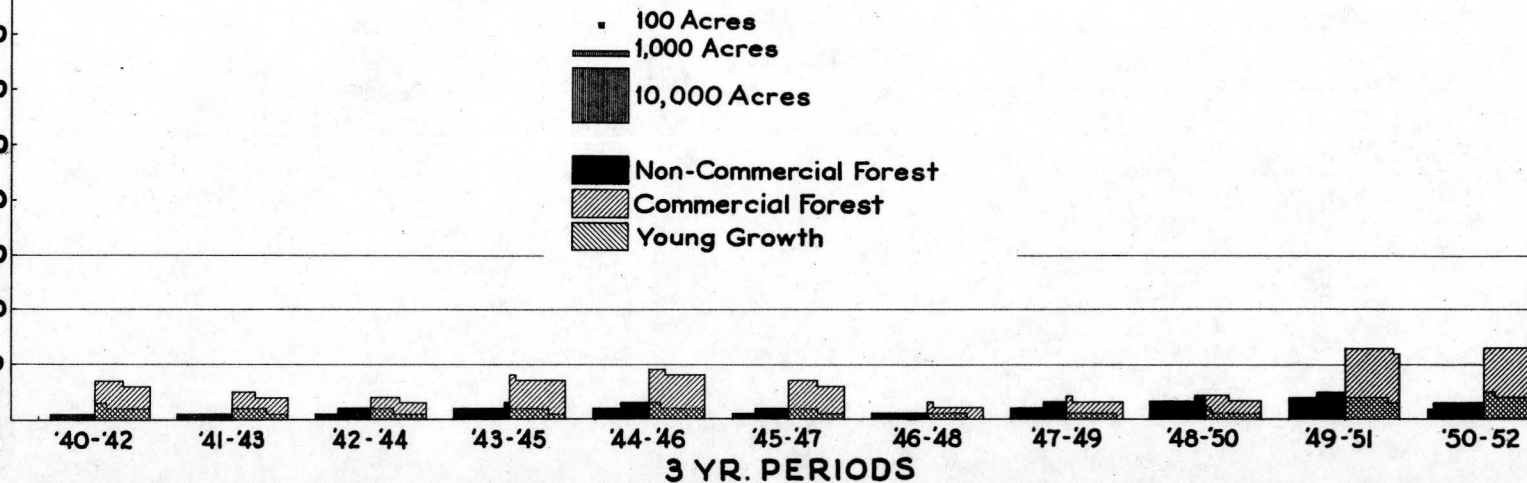
I-A-1 - Chart 12

Value of Resources Lost - M. Dollars



Average Area Burned - M. Acres

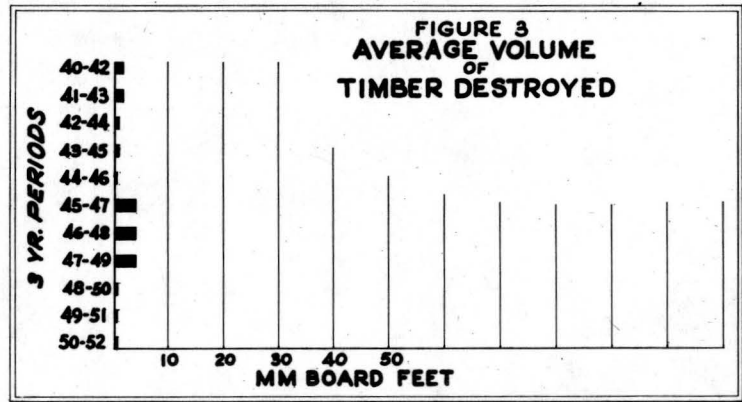
**FIGURE 2
AVERAGE AREA BURNED**



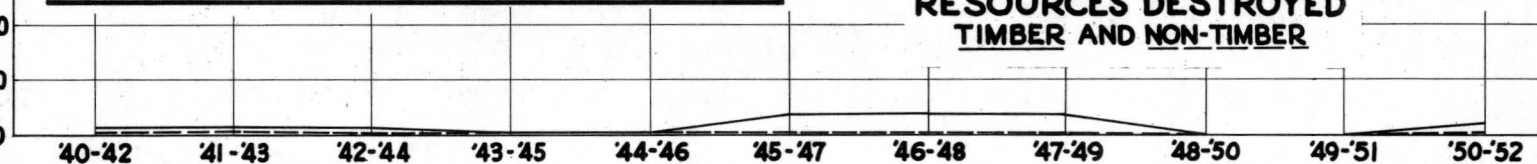
FIRE LOSSES - REGION 7 NATIONAL FOREST LANDS 1940-1952 BY 3 YEAR RUNNING AVERAGES

I-A-1 - Chart 13

VALUE OF RESOURCES LOST - M. DOLLARS

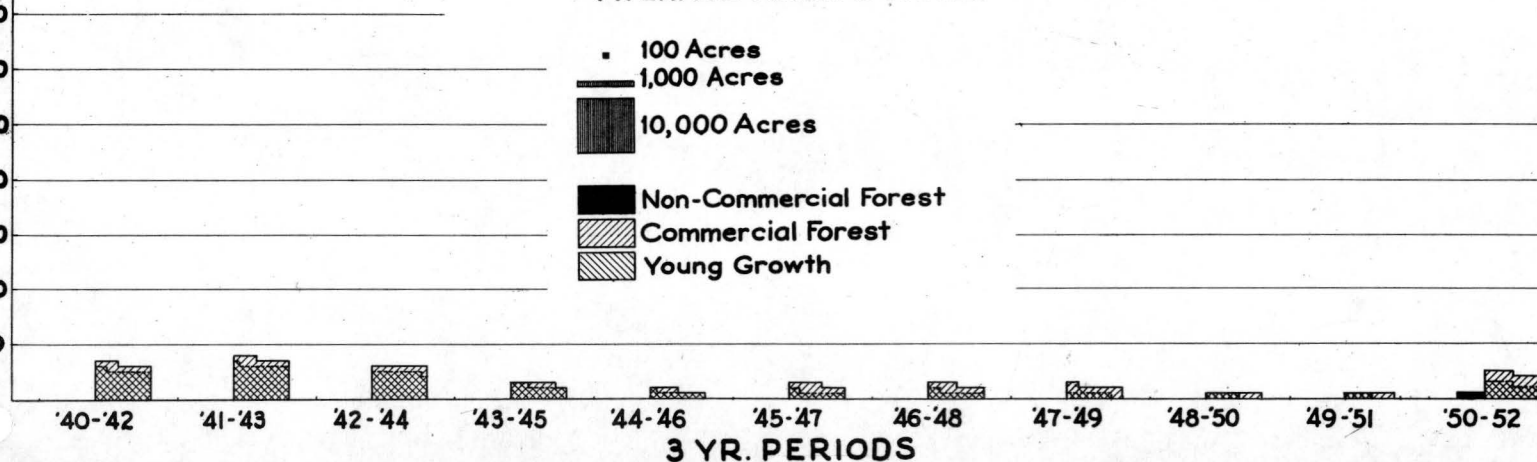


**FIGURE 1
AVERAGE VALUE
OF
RESOURCES DESTROYED
TIMBER AND NON-TIMBER**



AVERAGE AREA BURNED - M. ACRES

**FIGURE 2
AVERAGE AREA BURNED**



FIRE LOSSES - REGION 8 NATIONAL FOREST LANDS 1940-1952 BY 3 YEAR RUNNING AVERAGES

FIGURE 3
AVERAGE VOLUME
OF
TIMBER DESTROYED

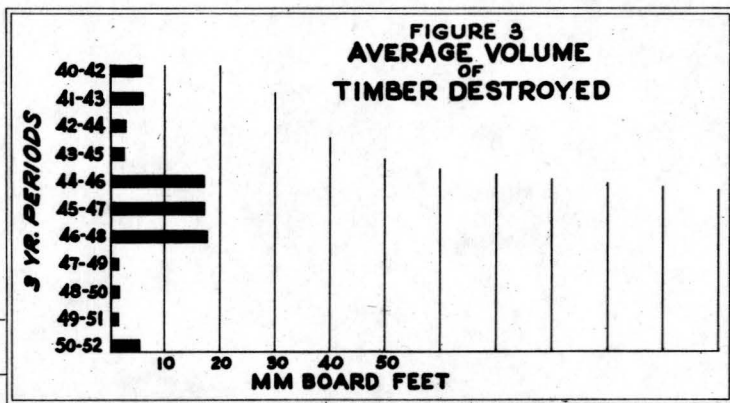


FIGURE 1
AVERAGE VALUE
OF
RESOURCES DESTROYED
TIMBER AND NON-TIMBER

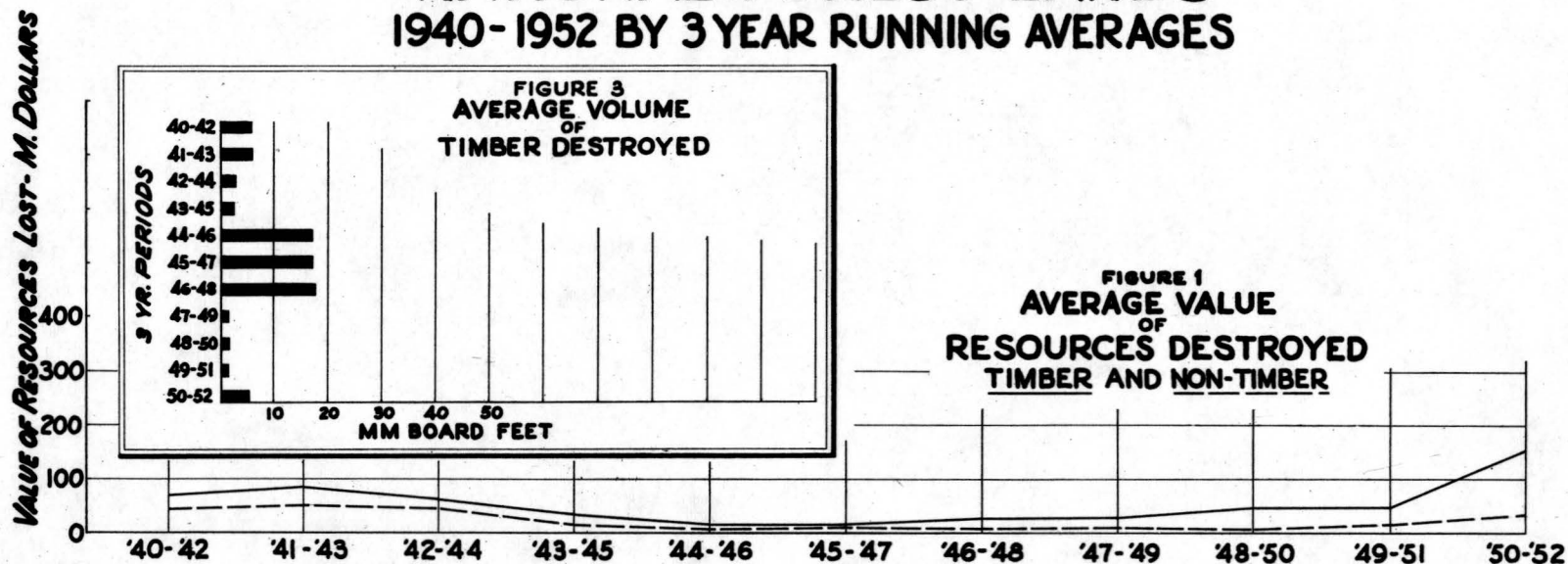
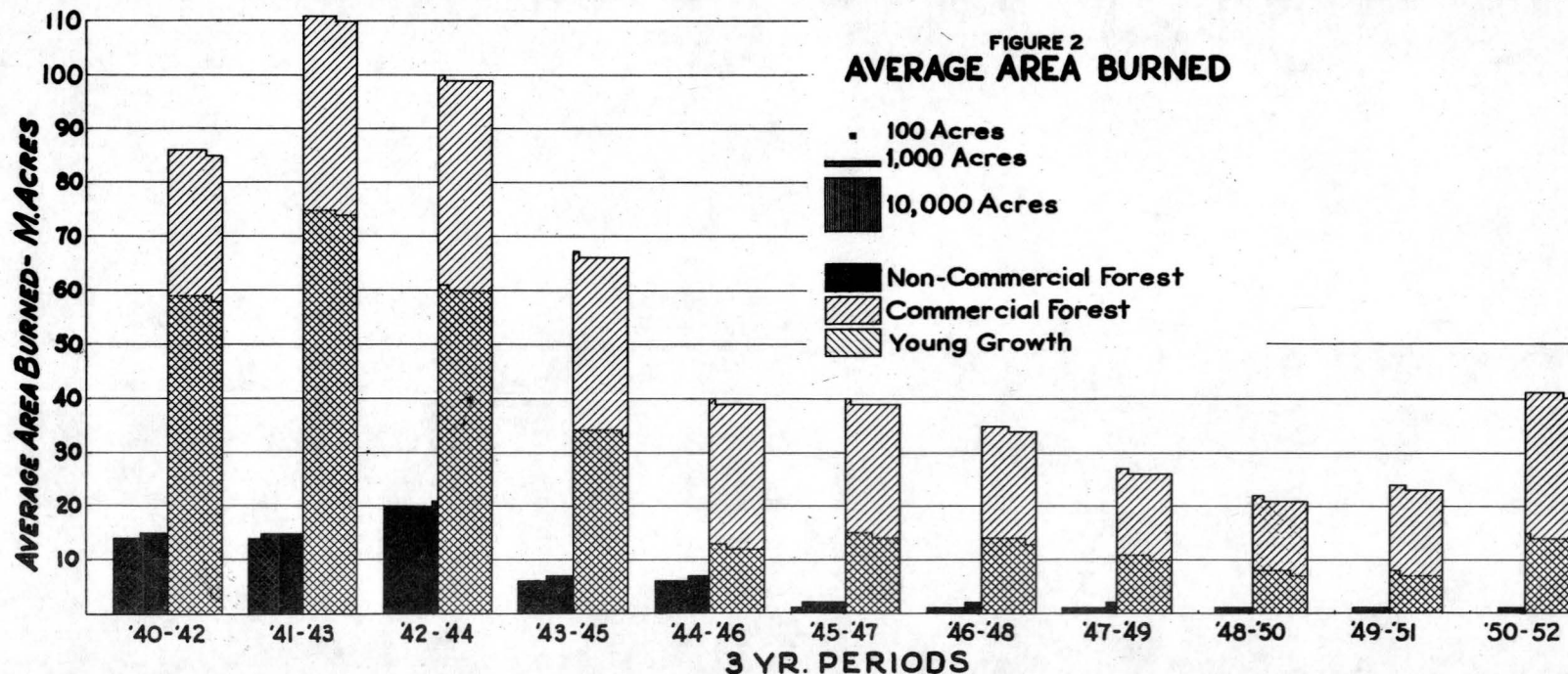
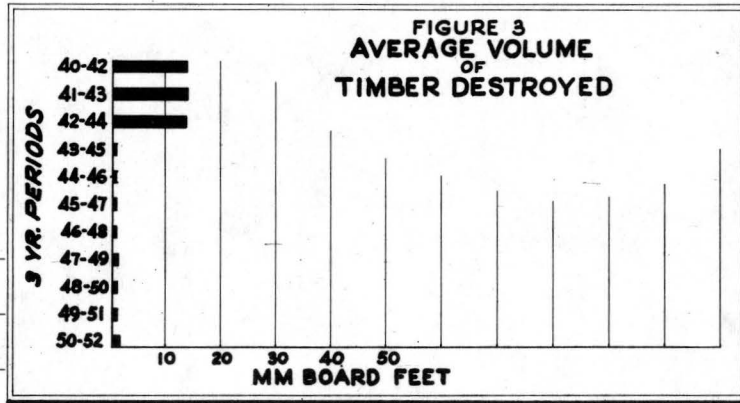


FIGURE 2
AVERAGE AREA BURNED

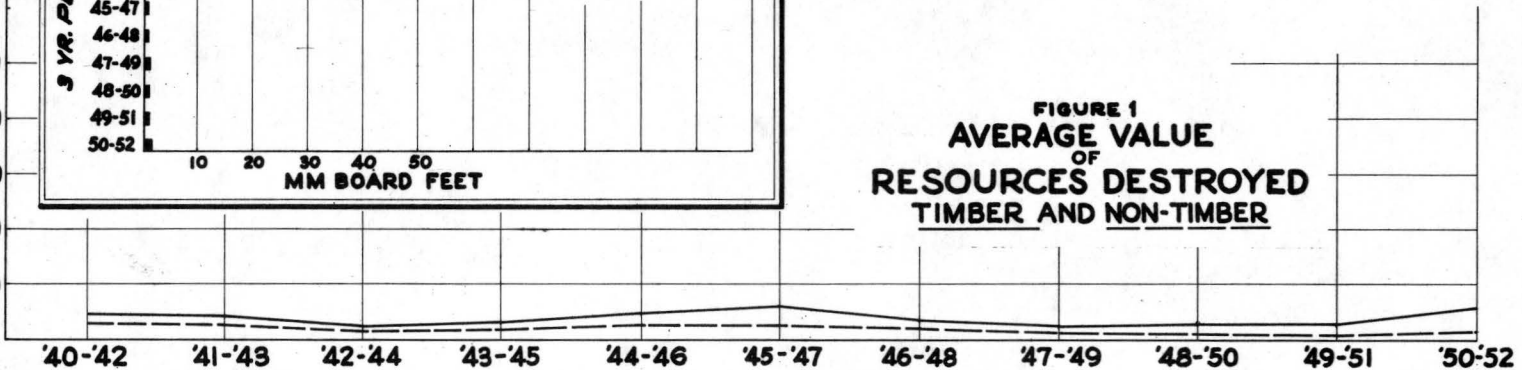


FIRE LOSSES - REGION 9 NATIONAL FOREST LANDS 1940-1952 BY 3 YEAR RUNNING AVERAGES

VALUE OF RESOURCES LOST - M. DOLLARS

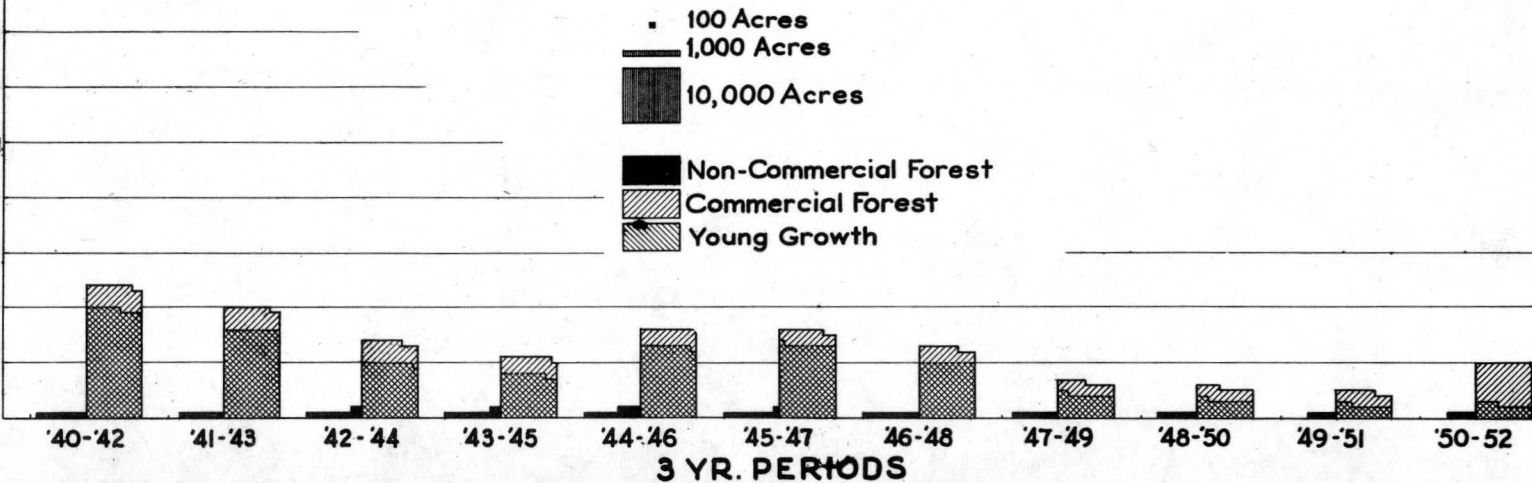


**FIGURE 1
AVERAGE VALUE
OF
RESOURCES DESTROYED
TIMBER AND NON-TIMBER**



AVERAGE AREA BURNED - M. ACRES

**FIGURE 2
AVERAGE AREA BURNED**



ACTUAL RELATIONSHIPS BETWEEN TANGIBLE VALUES AND FIRE INSURANCE INVESTMENT

Francis Marion N.F.

Coastal Plain--So. Carolina

245,438 Acres N.F.

82,972 " P.I.

328,410 Acres Protected

	<u>M.B.F.</u>	<u>Stumpage Value</u>	<u>Value Per Acre</u>
Merchantable Timber Volume 1947	929,473	\$29,448,000	\$83.31
Annual Increment	45,000	990,000	4.34
Allowable Annual Cut	30,000	660,000	2.69

Protection Expenditures

	<u>Cents Per Acre, N.F. Lands</u>			<u>Total Dollars</u>
	<u>Prevention & Presuppression</u>		<u>Suppression</u>	
Average FY 1952	FF	1.025	FF	5.287
	P&M	<u>2.308</u>		
	Total	3.333	5.287	\$0.0862
Every FY 1953	FF	0.654	FF	3.677
	P&M	<u>2.752</u>		
	Total	3.406	3.677	\$0.0708

Fire Load. 5-yr. Average, 1949-1953

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>	<u>Total</u>
Fires	17	31.8	41.2	41.4	9.4	3.6	1.2	1.2	.6	3.6	4.2	4	159.2
Burn													
NF Acres	341	405	610	655	55	29	13	9	3	32	10	26	2,188

Fires by Size Classes

A	B	C	D	E	Total
10.4	91.4	52	4	1.4	159.2

\$ 137,400

\$ 99,800

AN EXPERIMENT IN FIRE PROTECTION

ALL FIGURES BASED ON UNITS OF 100,000 ACRES

(5 YEAR PERIOD - NORMAL SEASON JUNE 1 TO NOV. 15)

PRESENT INADEQUATE PROTECTION

ADEQUATE PROTECTION

11.8 MEN

42.3 MEN

RESULTS

GAVE

MAN-CAUSED
FIRES

4.78 FIRES

3.15 FIRES

① FEWER M.C. FIRES

AREA
BURNED

1,676 ACRES

163 ACRES

② LESS AREA BURNED

DAMAGES

\$81,761

\$4,124

③ LOWER DAMAGES

SUPPRESSION
COSTS (F.F.)

\$31,434

\$8,898

④ SAVINGS IN SUPP. COSTS

SO. CALIF. NATIONAL FORESTS NORMAL PROTECTION
1948-1953

SO. CALIF. AREAS OF ADEQUATE PROTECTION (FLOOD CONTROL AREAS)
1948-1953

PROTECTION RESULTS

ADEQUACY OF FIRE PROTECTION
AS DETERMINED FROM A STUDY OF SAMPLE UNITS

By

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Division of Fire Research
Northern Rocky Mountain Experiment Station

Presented at

FIRE CONTROL CONFERENCE
Ogden, Utah, February 1954

Topic I-A-2

PROTECTION RESULTS

ADEQUACY OF FIRE PROTECTION AS DETERMINED FROM A STUDY OF SAMPLE MANAGEMENT UNITS

Introduction

Is fire control adequate on the national forests? Where are we going in fire control? What are the trends? Have we made progress or lost ground in recent years? Is protection adequate during critical years? Or adequate only during average or easy years?

Answers to the above questions are of paramount interest to the Forest Service. To get the answers a special survey was made of 18 national forests -- 2 forests in each region except Alaska. Details of how the survey was conducted are explained in the attached outline.

Summary of Fire Business on Sample Units

Fire control problems vary widely throughout the United States. No two national forests have identical problems. However, a study of sample units which represent a wide variety of fire control problems can indicate trends. Furthermore, an analysis of these trends can yield valuable information for investigating the general status of fire control management.

The 18 national forests used in this study had enough fire business and a wide enough variety of fire business to provide a good sample of Forest Service fire problems. Here is a summary of the fire business on these 18 national forests during the 16-year period 1938 - 1953:

1. Total fire occurrence - 39,774 (16,174 lightning and 23,600 man-caused fires)
2. Total area burned - 843,452 acres.
3. One forest had an average of only seven fires per year; another averaged 668 fires per year. The average fire occurrence on the 18 sample units was 138 fires per year - 59 percent man-caused and 41 percent lightning-caused.
4. One forest burned an average of only 17 acres per year; another averaged 10,668 acres burned per year. The average annual burn on the 18 national forests was 2,929 acres.

Fuels

Fuels are the stuff that burn in a forest fire. The type of fuels in an area being protected from fire has a great bearing on the size and nature of the job. Therefore, it is important to know something about

fuels and about the changes that occur in fuel types. On the 18 national forests fuels were distributed as follows:

<u>Period</u>	<u>Percent of Area In</u>		
	<u>Low Hazard</u>	<u>Medium Hazard</u>	<u>High Hazard</u>
	<u>Fuels</u>	<u>Fuels</u>	<u>Fuels</u>
Pre-war 1938 - 41	38	37	25
War 1942 - 45	36	38	26
Post-war 1946 - 49	34	39	27
Recent 1950 - 53	34	38	28

As shown above the area of high hazard fuels has increased steadily. The increase on the 18 national forests from the pre-war to the most recent period amounts to over 800,000 acres. If this same rate of increase could be applied to the entire national forest system, it would mean that some 6,000,000 acres of high hazard fuels have been added since 1938. In any event, the increase of high hazard fuels is great enough to cause serious consideration of the contributing factors.

Timber Use

The harvesting of forest products and fire control are associated in many ways. Timber sales open up new country, and facilitate access to many areas. Timber sales also bring changes to fuel types, introduce a new potential for fires to start, provide an opportunity for the use of fire in fuel reduction, and present a new challenge for the protection of the future forest crop. This influence of timber harvesting on the fire control job on the 18 sample national forests may be seen in these figures:

<u>Period</u>	<u>Annual Timber Cut</u> <u>M. Bd. Ft.</u>
1938 - 41	219,000
1942 - 45	432,000
1946 - 49	599,000
1950 - 53	817,000

Fire Weather

Weather is probably the most important variable influencing the nature and scope of fire control. The importance of weather was noticed in almost every phase of the study. Weather influenced fire occurrence, fire prevention, area burned, and in turn the requirements for manpower, equipment, and FF dollars. During the 16 years of the study fire weather was classified as follows:

<u>Year</u>	<u>No. Forests Having -</u>		
	<u>Easy</u>	<u>Average</u>	<u>Critical</u>
	<u>Fire Weather</u>	<u>Fire Weather</u>	<u>Fire Weather</u>
1938	6	8	4
1939	3	7	8

Year	No. Forests Having -		
	<u>Easy</u> Fire Weather	<u>Average</u> Fire Weather	<u>Critical</u> Fire Weather
1940	2	10	6
1941	6	9	3
1942	1	11	6
1943	3	11	4
1944	8	9	1
1945	7	8	3
1946	6	10	2
1947	6	8	4
1948	8	7	3
1949	2	11	5
1950	6	6	6
1951	4	9	5
1952	4	7	7
1953	3	9	6

Fire Weather and Fire Prevention

Fire weather influences the occurrence of man-caused fires. In the study this influence was as follows:

Average Annual Number Of Man-Caused Fires Per Forest

Easy Fire Weather — 48
Average Fire Weather — 77
Critical Fire Weather — 137

The fact that the greatest number of man-caused fires occur during critical fire weather clearly shows that fire prevention efforts should be increased during such periods. A special study was made of man-caused fires during critical fire weather to determine the results of fire prevention programs. This study shows that man-caused fires were reduced in the war and post-war periods, but increased again during the most recent period. The figures are as follows:

<u>Period</u>	<u>Average Annual Number Of Man-Caused Fires Per Forest In Years of Critical Fire Weather</u>
1938 - 41	192
1942 - 45	167
1946 - 49	58
1950 - 53	121

Careful examination of the above trends in man-caused fires shows that the low occurrence in 1946 - 49 is due mainly to an absence of critical years in certain southern and central state forests. Therefore, it is evident that a rather steady although small reduction of

man-caused fires has been obtained. It is also evident that the most important fire prevention problem occurs in critical fire weather. Success in fire prevention in all regions calls for careful evaluation of fire danger rating and fire weather forecasting aids in the preparation of plans and in the management of action programs.

Fire Weather and Area Burned

As fire weather becomes more severe, the area burned becomes larger. This fact was vividly demonstrated in the sample units as follows:

	Average Annual Burn Per Forest - Acres -
Easy Fire Weather	687
Average Fire Weather	1938
Critical Fire Weather	6935

Analyses of area burned data on all forests showed no significant trends in increase or decrease of fire sizes during the 16-year period. Fuel types and other variables influencing fire behavior must be considered to determine significant trends. However, it is clearly evident from the study that the great challenge in fire suppression occurs when weather factors favor the rapid spread of fires.

Basic Manpower

This phase of the study was aimed at determining the general status of the basic P&M-financed fire control organization. This is the basic prevention, suppression and initial-attack organization -- the people who have fire control as their primary job during the fire season. They are the fire control staff men at the supervisor's office, the district fire control assistants, the lookouts, the smokechasers, the initial-attack crew members, and other key men such as dispatchers, tank truck operators, etc. What is the status of this basic organization? Is it stronger or weaker than in former years?

We asked this question -- what has been the number of regularly planned, P&M-financed personnel on fire duty during the fire season?

The combined totals for the 18 national forests are as follows:

Average No. of Regularly Planned P&M-Financed Personnel on Fire Duty During Peak of Fire Season								
Four Year Period	Super- visor's Office	District F.C. Asst.'s	Lookouts	Smokechasers & Fire Guards	Includes samplers & road crews	Other	Total	
1938 - 41	42	78	349	246	299	143	1157	
1942 - 45	42	88	391	267	184	111	1083	
1946 - 49	40	98	291	253	214	124	1020	
1950 - 53	38	97	253	251	183	187	1009	

During the period studied, the basic fire organizations were reduced by 148 positions. All of the reductions were in lookouts, crew men, or staff assistants in the supervisor's office. Increases were made in district fire control assistants and specialist personnel such as dispatchers, radio operators, etc. Little change was effected in smokechasers although there were 16 fewer men in 1953 than during the war-time peak.

The greatest change in manning has occurred in the detection system. During 1950 - 53 there were 138 fewer lookouts manned than during the peak war-time period. Notes attached to forms returned from the various forests indicate that still further reductions will be necessary. No attempt was made to analyze the impact of this drastic change on detection efficiency. However, it is clear that such studies are needed on each forest.

Suppression Manpower

What is the status of the second line organization -- the forces called into action immediately behind the basic organization? The following figures show the general trends in suppression manpower during the 16-year period 1938 - 53:

Four Year Period	Average No. of Personnel Available for Fire Suppression Duty				
	Forest Service:		Other Personnel:		
	Organized :		Cooperator : Available Within:		
	Crews	Crews	8 Hours	Total	
1938 - 41	7516	2515	26,569	36,600	
1942 - 45	1841	2994	9,270	14,105	
1946 - 49	1224	3790	11,670	16,684	
1950 - 53	1113	3722	10,710	15,545	

The total loss in suppression manpower amounts to over 20,000 men -- more than the equivalent of an entire infantry division! Most of this loss in available suppression manpower is due to the elimination of CCC Camps. The trend in manpower loss which is most serious is the continuing reduction of organized Forest Service crews. The survey shows that increased reliance is placed on cooperator crews.

Fire Equipment

Each of the two previous phases of the study have shown a loss in manpower. As shown below the opposite is true for fire equipment:

Four Year Period	Average No. of Pieces of Equipment Owned by Forest Service or Readily Available by Rental					
	Tank	Plow	Bull-	Patrol		
	Trucks	Units	dozers	Aircraft	Helicopters	
1938 - 41	64	33	183	30	0	
1942 - 45	100	22	188	38	0	
1945 - 49	156	28	252	64	3	
1950 - 53	211	34	320	78	4	

These statistics illustrate rather vividly that fire control is changing to a mechanized operation. On just 18 national forests the net gain in equipment includes 147 tank trucks, 1 plow unit, 137 bulldozers, 40 patrol aircraft and 4 helicopters. This trend shows also that the character of the job is changing — different equipment calls for new systems of fire management and new techniques in fire suppression.

Status of Protection

Each national forest in the study was asked to evaluate protection status in easy, average and critical years. What percent of the ranger districts have adequate protection in average years? In critical years? The answers were:

<u>Period</u>	<u>Percent of Ranger Districts With Adequate Protection In</u>	
	<u>Average Years</u>	<u>Critical Years</u>
	- Percent -	
1938 - 41	81	45
1942 - 45	49	19
1946 - 49	70	27
1950 - 53	73	27

The significance of the above evaluation depends in part upon the definition of adequate protection. For example, the 18 national forests burned nearly 850,000 acres in 16 years or about 3 percent of the 28,000,000 acres within their protection boundaries. The average annual burn was .19 percent of the area protected. Does this constitute adequate protection?

Determinations of the adequacy of protection must be evaluated on each individual unit. Area burned cannot be the sole measure of adequate protection. Values at stake, damage, and long-range effects of fires on land productivity all have a bearing on a rating of protection adequacy. No attempt was made in this study to make such evaluations. However, the study does provide a basis for the following conclusions:

1. Protection is not adequate during critical fire weather on most national forests. Identification of the periods of critical fire weather and the development of action programs to meet the special requirements of these periods are top-priority jobs. Effective and economical fire control during such periods calls for the development of highly flexible organizations.
2. The adequacy of protection during average fire weather depends largely upon fuel conditions. Fires starting in high-hazard fuels cause severe damage. Many large and costly fires are occurring under average fire weather situations in worse than average fuels. Development of adequate protection for these situations calls for

identification of trouble-making fuels, reduction of such fuels and programs to prevent creation of additional areas, and better fire prevention and suppression techniques tailored specifically for the fuel types in question.

3. Fire control is almost universally adequate during easy fire weather. The challenge here is to identify these periods of easy weather and then do everything possible to effect justifiable savings in the cost of protection.

TO: Regional Foresters, Regions 1, 2, 3, 4, 5, 6, 7, 8, and 9. Oct. 18, 1953

FROM: Clare W. Hendee, Chairman, Task Force I, by J. S. Barrows, Acting

SUBJECT: F(RF-NRM) SUPERVISION, Meetings, (Fire Control Conference 1954)

Report Due Dec. 21, 1953

This memorandum and the accompanying attachments outline a plan for reporting information needed at the national fire control conference to be held in February 1954.

One of the objectives of the conference is stock taking in fire control management. For this part of the conference it is desired to obtain certain basic information from selected national forests. The information desired is explained in the attached summary and form.

Jack Barrows of the Northern Rocky Mountain Station has been assigned the task of analyzing the data submitted from two sample national forests in each region. The Task Force Chairman has approved the plan for assembling needed information, but to save time the material is being sent directly from Missoula. Please fill out the attached forms for the two national forests in your region and forward them directly to Mr. Barrows not later than December 21.

It is recognized that some of the data requested may have to be estimated and reported on the basis of experienced judgment. However, it is believed that careful estimates can provide valuable information for the fire conferees to determine trends and the general status of fire control management.

You will note that 1953 data is being requested in addition to data for the period 1938 through 1952. We believe that it is important for the conference to have information from the most recent fire season. However because of the time needed to analyze this information and prepare papers for the conference we will have to omit data on fires that occur in December 1953.

Sufficient copies of this memorandum are being sent to you for each national forest involved.

Attachments

J. S. Barrows

Fire Control Conference
February 1954

STOCK TAKING IN FIRE CONTROL MANAGEMENT

The Fire Control Conference to be held in February 1954 will consider the adequacy of fire protection as determined from a study of sample management units. The objective of this study will be to find out: Where are we going in fire control? Have we made progress or lost ground in recent years? Is protection adequate during critical years? Or adequate only during average or easy years?

It would be a tremendous job to study each national forest in determining the adequacy of protection. Even samples will not provide the whole story. However, samples will indicate trends. Therefore two national forests in each region will be used to provide the fire conference with live facts on the trends in fire control. The forests in the sample have been selected to provide a wide range of fire conditions--flat woods and mountain conditions in Region 8, southern brush fields and northern timber forests in Region 5, and so on. The national forests in the sample are as follows:

Region 1	Kaniksu, Lewis & Clark
Region 2	Black Hills, Arapaho
Region 3	Coconino, Lincoln
Region 4	Payette, Wasatch
Region 5	San Bernardino, Shasta
Region 6	Willamette, Chelan
Region 7	White Mountain, Cumberland
Region 8	Francis Marion, Chattahooche
Region 9	Superior, Clark

Basic data to be used in the study will be entered on the attached form. It is realized that some of the data may not be readily available in the exact form requested. In such cases the best and most accurate estimate will have to be made. The objective is to indicate trends in fire control and exact figures are not absolutely essential provided that the trend is shown accurately.

The 16 years 1938 through 1953 will be used in the study. Part of the information will be analyzed by significant 4-year periods as follows:

Pre-war period	1938 -- 1941
War period	1942 -- 1945
Post-war period	1946 -- 1949
Recent period	1950 -- 1953

The following are guide lines for filling out the attached form:

FUELS AND TIMBER USE

1. Acres inside protection boundary. For each 4-year period show the average number of acres protected by the Forest Service. This is an important figure which will be used in computing percent of area burned in each 4-year period.
2. Percent of area in low-, medium-, and high-hazard fuels. The objective here is to determine changes in fuel conditions. Does the forest have a larger or smaller area of dangerous fuels today than existed in former years? Unfortunately the Forest Service does not have any one fuel-classification system that will enable exact comparisons between regions. However it is believed that existing regional standards and experienced judgment will enable estimates to be made of trends in fuel condition. For each 4-year period show the percent of the forest-protection area in:

Low-hazard fuels: Generally characterized by low rate of spread and low to medium resistance to control. Typical example is dense virgin forest where ground fuels are generally shaded.

Medium-hazard fuels: Generally characterized by medium rate of spread and medium to high resistance to control. Also includes grass fuels where rate of spread may be termed high to extreme, but resistance to control is low. Typical timber situations contain moderate amounts of continuous ground fuels only partially shaded with aerial fuels indicating moderate numbers of snags. In this fuel type fires will tend to spread continuously under average fire-weather conditions and may spot ahead or crown under critical conditions.

High-hazard fuels: Generally characterized by high to extreme rate of spread and resistance to control. Also includes the very worst grass types with a rate of spread that may be termed flash. Typical examples are heavy logging slash, dense fields of dangerous brush types, southern pine types with a great amount of dangerous understory fuels, single burns containing great numbers of snags, blowdowns, etc. Only those fuels which by regional standards are definitely considered to cause fast-spreading and difficult to control fires should be included in this category.

3. Timber cut, M board feet. For each 4-year period show the average annual timber cut.

FIRE WEATHER, RISK, AND FIRE OCCURRENCE

4. Fire weather. For each year, 1938 through 1953, indicate whether the fire weather for the forest would be rated easy, average, or critical. Unfortunately all Forest Service regions do not have comparable systems for rating the severity of fire seasons. Therefore the ratings may have to be estimated from available fire-danger-rating and weather records. In general an easy season would be not over 33 percent of the worst probable fire danger, an average season 33 to 66 percent, and critical 67 percent or greater. Eastern and southern forests may have to give separate ratings to the spring and fall fire seasons.

5. Number of national forest visitors. For each year, 1938 through 1953, show total number of national forest visitors.

6. Fire occurrence. For each year show the number of lightning fires, man-caused fires and total fires occurring within the protection boundary.

SIZE CLASS OF FIRE AND AREA BURNED

7. For each year, 1938 through 1953, show the number and percent of fires by size class.

8. For each year, 1938 through 1953, show the acres burned within the national forest protection boundary by lightning and man-caused fires. Show total acres burned.

BASIC MANPOWER

9. Average number of regularly planned, P&M financed personnel on fire duty during the peak fire season. The objective here is to show the trends in regular Forest Service manpower during pre-war, war, post-war, and recent periods. As shown on the form, this part of the analysis will show only the basic supervisory, detection, and initial attack force. It is realized that some of these factors, particularly for former years will have to be estimated. However, it is quite important to the objectives of the fire conference to obtain fire personnel figures that will accurately indicate the trends. The purpose is to show only those personnel financed from P&M fire-control funds. During the war period this may include the various war emergency funds used to finance classes of personnel indicated. Personnel financed from FF or CCC funds should not be included. For each 4-year period show the average number of personnel as follows:

Supervisor's office: include fire staff officer, dispatcher, aerial observer, etc.

District fire control assistants: include only those district fire control assistants who have general fire supervisory duties and are financed from P&M fire-control funds.

Lookouts: Include all lookouts on duty at peak of fire season and financed from P&M funds.

Smokechasers: Include all fire guards, prevention guards and smokechasers financed from P&M funds. Forests using smokejumpers from a regional pool should include the number of jumpers that they finance.

Crewmen: Include all P&M-financed fire crewmen including foremen, tank truck operators, etc.

Other: Include all other P&M-financed fire personnel including ranger district dispatchers, cooks, warehousemen, etc.

SUPPRESSION MANPOWER

10. Average number of personnel available for fire suppression duty. The purpose of this section is to show the number of other personnel organized by the national forest for fire suppression duty regardless of fund paid from when not on fire duty. Again it is realized that estimates will be necessary. We want to find out if there are a larger or smaller number of personnel available on or near the forest for fire suppression duty. Do not include personnel who would be dispatched from another forest or from a regional pool. Include only those personnel for which the national forest being studied has organizational responsibility as follows:

Organized Forest Service crews: Show average number of men available in road crews, trail crews, CCC crews, etc.

Organized cooperator crews: Show average number of men available in organized logging crews, state or county road crews, etc.

Other personnel available within eight hours: Include only those personnel that the forest would recruit locally on or in the immediate vicinity of the forest. Personnel would include unorganized crews and individuals, pickup labor, etc. that could be recruited and signed up for fire fighting. It is realized that this can only be a general estimate. If possible we want to show the general trends in the availability of fire-fighting labor.

Total: Show the total of all classes of fire suppression manpower.

EQUIPMENT

11. Average number of pieces of equipment owned by Forest Service or readily available by rental. The objective here is to indicate the trends in the availability of major items of fire equipment. All equipment listed should be owned by the Forest Service or readily available by rental from operators working on or in the immediate vicinity of the forest. For each 4-year period show the number of tank trucks, plow units, bulldozers, patrol aircraft, and helicopters.

SUMMARY OF PROTECTION STATUS

12. Number of ranger districts with sufficient forces to provide adequate protection in easy, average, and critical years. For each 4-year period show the number of ranger districts on the forest that would be rated as adequate to handle fire protection in easy, average or critical years. Regional standards should be used in determining adequate protection.

Fire Control Conference
February 1954

Region _____ Forest _____ Date _____

STOCK TAKING IN FIRE CONTROL MANAGEMENT

Fuels and Timber Use

Four Year Average	1. Acres Inside Protection Boundary	2. Percent of Area In -			3. Annual Timber Cut M. Bd. Ft.
		Low-Hazard	Med-Hazard	High-Hazard	
1938 -- 1941					
1942 -- 1945					
1946 -- 1949					
1950 -- 1953					

Fire Weather, Risk, and Fire Occurrence

Year	4. Fire Weather			5. No. National Forest Visitors	6. Fire Occurrence		
	Easy	Ave.	Crit.		Lightning	Man-Caused	Total
1938							
1939							
1940							
1941							
1942							
1943							
1944							
1945							
1946							
1947							
1948							
1949							
1950							
1951							
1952							
1953							

Size Class Of Fire And Area Burned

Year	7. No. And Percent Of Fires By Size Class					8. Acres Burned		
	Class A		Class B		Cl.C,D,&E No. %	Lightning	Man-Caused	Total
	No. %	No. %						
1938								
1939								
1940								
1941								
1942								
1943								
1944								
1945								
1946								
1947								
1948								
1949								
1950								
1951								
1952								
1953								

Basic Manpower

Four Year Period	9. Average No. Of Regularly Planned P&M-Financed Personnel On Fire Duty During Peak Of Fire Season					
	Supervisor's Office	District F.C. Assistants	Lookouts	Smoke- chasers & Fire Guards	Crew- men	Other
1938-1941						
1942-1945						
1946-1949						
1950-1953						

Suppression Manpower

Four Year Period	10. Average No. Of Personnel Available For Fire Suppression Duty			
	Forest Service Organized Crews	Organized Cooperator Crews	Other Personnel Available With- in 8 Hours	Total
1938 -- 1941				
1942 -- 1945				
1946 -- 1949				
1950 -- 1953				

Equipment

Four Year Period	11. Average No. Of Pieces Of Equipment Owned By Forest Service Or Readily Available By Rental				
	Tank Trucks	Plow Units	Bull- dozers	Patrol Aircraft	Helicopters
1938 -- 1941					
1942 -- 1945					
1946 -- 1949					
1950 -- 1953					

Summary of Protection Status

Four Year Period	12. Number Of Ranger Districts With Sufficient Forces To Provide Adequate Protection In -		
	Easy Years	Average Years	Critical Years
1938 -- 1941			
1942 -- 1945			
1946 -- 1949			
1950 -- 1953			

TRENDS IN PROTECTION STRENGTH

PRESUPPRESSION FORCES

By

Mayhew H. Davis, Chief,
Division of Operation and Fire Control, R-3

Presented at

FIRE CONTROL CONFERENCE
Ogden, Utah, February 1954

Topic I-B-1

TRENDS IN PROTECTION STRENGTH

PRESUPPRESSION FORCES

The Chief's circular of April 21, 1953 having to do with this topic suggested "charts - - - comparing man-months of seasonal protection employees such as lookouts, firemen, suppression crew members, patrolmen, dispatchers, etc., available in F.Y. 1953 compared with F.Y. 1945; also the total man-months each region estimates it needs to assure adequate protection during average worst fire year." (The latter item has been deleted from this paper to avoid overlap with Topic VII-C).

The Chief's circular suggested that "fundamentals - be stressed", and that "percentage could be developed showing the percent of the fire force classified as initial action, percentage classified as supervisory and the percentage classified as "behind-the-lines" employees." The question was asked, "How can the number of men classified as initial action personnel be increased under present levels of financing?"

We have endeavored to follow the guide lines set up in the Chief's circular in preparing this topic presentation. A questionnaire was sent Regions 1 - 9, inclusive.

Tabulation "A" attached to this paper is a summary of the data received with respect to comparative manning (a) 1945, and (b) 1953.

The following tabulation summarizes by regions the 1954 F.Y. fire organization financed from P&M seasonal and cooperative funds in percentage relationship:

For. F.Y. 1954 - organization financed from P&M - 101 seasonal fire and cooperative funds:

																				Aug.
	:	1	:	2	:	3	:	4	:	5	:	6	:	7	:	8	:	9	:	Total
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
A. Percent of fire force classed initial attack: (incl. Lookouts)	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	70.4	:	70	:	54	:	77	:	83	:	75	:	63	:	23	:	73	:	65.33
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
B. Percent of fire force classified as supervisory (incl. ass't rangers and G.D.A's)	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	10.5	:	20	:	30	:	10	:	6	:	8	:	17	:	2	:	19	:	13.55
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C. Percent of fire force classified as "Behind- the-lines" (incl. dispatchers, radio technicians, and law enforcement employees	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	19.1	:	10	:	16	:	13	:	11	:	25	:	20	:	3	:	8	:	13.89

100.0

The following questions were asked of each region:

1. Please give your best answer to the question: "How can the number of men classified as initial action personnel be increased under present levels of financing?"
2. When was the initial attack force planning last revised? Is it currently in line with protection needs? (if answer is no, explain why.)
3. Any comments or data you may wish to add appropriate to this topic which may assist to present the presuppression force problem more clearly.

The comments received from the regions is given here for the record:

1. How can the number of men classified as initial action personnel be increased under present levels of financing?

Region 1 - "More adequate financing of other activities such as maintenance and construction of fire control improvements that are a drain on seasonal force fire funds."

Region 2 - "Continue to reduce seasonal force funds for supervisor's staff and assistant ranger positions and for assistance to other divisions."

Region 3 - "Can be done only by decreasing GDA class of employee, expenditures for equipment and less support to other activities (mapping, etc.)"

Region 4 - "The opportunities of increasing the number of men classified as initial action personnel under the present levels of financing have been explored and studied continuously during the past few years. It has been the subject of Board of Review and in our review and analysis of all annual operating fire plans for the forests. Even if we plug the few remaining loop-holes and take advantage of every possibility the percentage of initial action personnel cannot be materially increased without an increased appropriation. The following points might be explored at the Chief's meeting:

- a. Financing of Assistant Rangers - Under the present system of financing the correlated standards do not allow for adequate financing of assistant rangers so it is necessary to cover part of their salaries from project funds and from seasonal fire control funds. Our contribution from fire funds is only about 2% and particular care is exercised to see that the positions so financed contribute materially to the fire control function.

b. Financing of Forest Fire Staff Positions (Staff Fire Control Assistants)

We have five yearlong staff positions partially financed from seasonal fire control funds which take about 3% of the total seasonal allotment. If these were recognized in the base, it would allow for a small increase in the funds available for financing more initial attack personnel. However, these positions are important in our present scheme of fire control management and we would want to continue them even though not allowed in the base.

c. Financing of Communication Technicians and Repair of Radios -

With the trend to build up the VHF network and in some cases the maintenance of two essential systems of communication - radio and telephone lines - we find that the base for maintenance is not adequate. It is, therefore, necessary to divert considerable fire dollars to the maintenance of the radio net and to help finance some technicians. The job of radio maintenance is technical and requires well-trained technicians who cannot be obtained on a short seasonal basis. We are now diverting from 2 to 4% of our seasonal fire control funds to this particular job.

d. Yearlong Employment of General District Assistants -

Since these General District Assistants are the nucleus and often the backbone of our fire control field organization, we are attempting to provide yearlong employment with the help of project funds. We are currently checking to make sure that our charges to fire and other funds are fair and justified.

e. Maintenance of Pack Stock - The regional base for horse feed and other maintenance costs, sets a maximum on numbers of horses and mules to be financed. When the number exceeds the base, it is necessary when the animals are needed for fire control purposes to supplement the allowance base from seasonal fire control funds. Although this diversion is not high and savings are limited, it does call for continued watchfulness to be on a justifiable economic basis. Even though the percentage of initial action personnel might be increased to a certain extent by drastic curtailment in some of the items listed above, the benefits of the increase are not proportionate to the loss that might be sustained. The use of helicopters when the cost can be reduced may obviate the need for some but not all of our pack stock.

Region 5 - "There is not much nourishment in this with present level of financing. Increasing costs tend to reduce number of men and man-months. It might be possible to curtail some behind-the-lines personnel, but most water has already been squeezed out.

One trap that we should not fall into is the assumption made by some people that supervisory personnel for fire control, such as assistant rangers and fire control assistants to rangers, can be cut down much further than they have already been cut in order to increase initial attack forces. The fewer initial attack forces we have, the more important it becomes for us to depend upon cooperators such as individual ranchers, miners, timber operators, and other forest users as part of our important initial attack force. If we take away the people whose responsibility it is to make these contacts and keep these cooperators in organized crews, we lessen our over-all striking force while we increase the number of green kids on a suppression crew by maybe two or three for each one of these key personnel we remove. We must maintain a balance between these personnel and those listed as initial attack.

It seems axiomatic that when a region is reduced in over-all financing a higher percentage of seasonal forest funds are taken away from use for initial attack personnel and diverted to other items that seem important to the region. This follows the line of "them that have pay." This apparently cannot be corrected without pretty strict and definite guidelines from above. It is always easy to attack fire control seasonal forest funds because there is an authority of FF that fills in behind in the event of a real emergency."

Region 6 - "The only short-term fire personnel in this Region not considered for initial attack are the ranger district clerks, telephone operators and primary lookouts. Even primary lookouts go to fires close to their stations. We know of no way to make more of the short term fire force available for initial attack on fires."

Region 7 - "This problem is being met in Region 7 through the National Forest warden system which has been in effect since its initial organization in 1914. The arrangement gives each ranger district initial attack force personnel up to 25 men depending on the number of wardens per district. Wardens are local resident leaders in the forest community of a number of vocations, but usually they are farmers and timber operators. Some of the most effective wardens are operators of national forest stumpage. Wardens are busy men - sometimes out of reach for a particular situation, but the number of wardens organized is intended to offset this inherent weakness of the system. Get-away time is a problem with a volunteer organization which

requires a lot of attention but again this drawback has been overcome and a fairly credible get-away time record has been maintained in the region which depends practically 100 percent on its warden system for its initial attack force. Wardens are not a cost against P&M 101 seasonal force except for a modest outlay for a one-day annual training meeting.

Region 8 - "We see no way to increase number of initial attack personnel under present levels of financing. Between 1945 and 1953, P&M SFFC allotments increased 74.9%. At the same time, the weighted pay rates for fire personnel increased 100.4%. Cost of equipment items such as tractors, truck transports and tankers increased 140-150%.

Under our conditions a lookout very seldom can leave his post to attack a fire. Over 90% of our fires are man-caused, the majority being incendiary and occurring in bunches. The lookout is then most valuable in place.

In our rougher terrain, the primary attack force is warden crews; local citizens who are on the payroll only when fighting fires. In the flatter areas, the initial attack is by tractor-plow units of 3 men each. In the low country, so far as equipment is concerned, we are within 5% of minimum needs. The weakness there is the time lost in getting plow crew leaders to be on fire duty during hazardous periods. In the mountain areas we are becoming increasingly weak so far as regular financed fire personnel are concerned. The alternative has had to be emergency employments from FF during high hazard periods.

Region 9 - "The number of initial action personnel cannot be increased under present levels of financing. Giving longer employment to the present men to make their jobs more attractive and keep them is of more concern than increasing the number of personnel.

2. (a) When was the initial attack force planning last revised: ?

Region

- 1 - 1949 - 50
- 2 - 1953
- 3 - Now in process.
- 4 - ~~Not answered~~ 11/53
- 5 - 1950
- 6 - 1944 - 45
- 7 - Not answered
- 8 - 1951
- 9 - Each year as needed

2.(b) Is it currently in line with protection needs?
(If answer is "no" please explain why.)

- Region 1 - "Reasonably so. Should undergo major revision in another year or two due to upsets of recent expansion in aerial activity."
- Region 2 - "We are unable to finance first attack personnel for the full fire season from seasonal force. Have had to lay-off or finance from FF."
- Region 3 - "No. We are confronted with a major re-planning job involving detection, initial attack forces, mechanized equipment, dispatching, and 2nd line fire fighters. Use of Indians has changed the picture materially. With present financing and available personnel will require several years to do the job."
- Region 3 - No comment.
- Region 5 - "Our latest initial attack force replanning was in 1950. It is still reasonably in line."
- Region 6 - "Fuel typing on the ranger district has not kept pace with cutting and the lookout panoramic pictures are now 15 years old. They no longer portray the "forest" conditions in many instances."
- Region 7 - No comment.
- Region 8 - "Not in line with protection needs."
- Region 9 - "The planning is currently in line with protection needs. However, calculated chances are taken and the plan is not always carried out fully in an effort to save FFF as considered necessary."

3. Further Comments relative the Presuppression Problem:

- Region 1 - "Continuous and sometimes drastic changes due to aerial development, expansion in use of mechanical fire line equipment and fluctuation in amount and quality of manpower make continual current revision necessary. This we try to do, but with only partial success."
- Region 2 - "All radio in R-2 is financed from seasonal fire funds. We should have some help from P&M since 50% use is for administration."
- Region 3 - "Our job in presuppression is in excess materially of funds available to do the job with. Replanning should help tie down the dollar deficiency."
- Region 8 - "We have no lookouts or firemen employed steadily. Employments are on day-by-day basis according to existing degree of fire weather. As we cannot offer steady employment during a month even during our peak fire months, we are losing our more reliable men, who are attracted to the steady jobs available in industry."

Some of our own Service policies are weakening the fire organization. The trend is against employment of non-technical personnel in favor of Junior Foresters. That is progressive if not overdone. However, it has practically become impossible for a nontechnical man to see any opportunity to advance beyond GS-4 or GS-5. We find that really able, ambitious men do not care to dedicate themselves to a career with that limitation. Such men have an important place in a fire organization. They know the area, people and conditions and stay put. Necessarily Junior Foresters are shifted frequently and the backbone of local knowledge and contact is lost.

No comments from other regions.

Conclusions: What can we conclude from the factual material secured and comments summarized above? It is not a simple task.

First as to the initial attack personnel. How can the man-months of this group be increased? It is difficult to evaluate the trends and conclusions as to need reflected in the summary chart of seasonal force planning for the years 1945, 1953, and "needed to do the job."

Many things have transpired since the last revision of the Chief's allotment base - predicated on 1949 Volumes of Business and fire occurrence for the preceding five years. Some of these events are:

1. Greater use of water and mechanized equipment in some regions.
2. Development in type and use of aircraft and smokejumper personnel.
3. Greater competition for available man-power, seasonal employees and firefighters by industry.
4. Decrease in wages paid employees when compared to the purchase value of the dollar.
5. Changes in fire occurrence and fire job load between regions - a major factor.

It seems advisable to recognize variations in regional policy as to the extent to which seasonal fire funds are used for purposes other than the basic purposes of seasonal fire organization financing. Some of these uses are:

- a. Mapping - on the premise that adequate maps are essential to "on the ground" performance.
- b. Communication - radio, and telephone facilities are essential to the operation of the seasonal fire force.
- c. Fire improvements, such as lookout towers, seasonal fire force living quarters, water development, etc.

It appears evident that unless other financing is provided it will be essential to use seasonal fire funds to provide the structures, facilities, equipment, accessories such as maps, etc., essential to the work assigned the seasonal fire force. I submit that this is an essential element of expense and must be assessed as a charge against such funds.

Tabulation of material submitted by the regions indicates that, using 1945 as a base period that in 1953 - ~~94.86%~~ of the man-months were employed as against 1945, but that an increase in initial attack force personnel equivalent to 150.1% of 1945 is essential to do the job. It is assumed, for reasons quite obvious - that each region is budgeting its available fire seasonal force funds honestly and realistically and on a "balanced" basis. By "balanced" is meant that funds are set up so that for the man-months of initial attack forces financed, salary amounts are in balance with other authorized and recognized expense elements of training, equipment, travel, etc.

If the foregoing assumption is correct it would appear that present finances would need to be increased by ~~50.1%~~ ^{67%} to provide the indicated needed increase in seasonal forces.

The tabulation under the heading "1954 F.Y. organization financed from P&M seasonal fire and cooperative funds" reflects variation in percentage of "behind-the-lines" fire force financed of from 8% in R-9 to 25% in R-6. I am unable to draw any sound conclusion from this tabulation because of lack of information as to organization structure, financial policy involved, and other factors with which the conference group is familiar. It does raise questions as to variation between regions in practice and policy in financial planning and controls in connection therewith.

In summation of conclusions, it is believed we can ask the following questions:

1. Are differences in organization, state of completion of fire improvements, equipment, communication, and facilities such as maps, and financial policies between regions such as to warrant continued "flexibility" in use of seasonal funds? Is this the primary reason for lack of more effective "front line" manning?
2. Is a service-wide control, through use of limitations on seasonal fire funds essential or desirable?
3. What can be done to clarify the present situation?
4. It seems self-evident that "front line" personnel alone cannot function effectively unless there is provision for training, inspection, direction, equipment and other essentials. Since the pro-rata budgeting of regional office, supervisor-staff and district ranger P&M funds to P&M 101 - fire activities cannot bridge the "gap" it follows that these essential expense elements must be a charge against "seasonal" fire P&M and cooperative funds. I do not go along with the premise that fire dispatchers at supervisor's and regional offices, law enforcement officers, fire

training and inspection personnel are not an integral part of the seasonal fire organization and to the extent that such positions must be financed year long from seasonal funds to retain competent personnel for these vital assignments it appears logical that they should be charged to the seasonal force activity unless financed otherwise.

It is appreciated that this topic has overlapped that of subtopic C, Topic VIII: "Fire Financing." My apologies for this but the "trends in suppression strength" as assigned and the last sentence of the comment under this heading in the Chief's circular which reads "How can the number of men classified as initial action personnel be increased under present levels of financing?", makes it impracticable to cover the subject without overlap.

Recommendations:

1. In order to determine how best to get maximum use of P&M seasonal fire force funds for "on-the-ground" "front-line" purposes, we need better data on the following:
 - a. What are the needs service-wide and by regions for:
 - (1) Fire control improvements (lookouts, dwellings, water systems, etc.)
 - (2) Fire control communication (radios, telephone)
 - (3) Other items such as maps, etc.
 - b. What are the needs service-wide and by regions for:
 - (1) Law enforcement (including fire prevention) officers?
 - (2) Training officers - fully competent in fire control?
 - (3) Other so-called "behind the lines" personnel such as
 - (a) Regional or forest dispatchers, (b) radio technicians appropriately chargeable to fire control.
2. Capital investment items need to be evaluated in terms of (a) initial cost, and (b) replacement costs on the basis of an up-to-date and currently maintained fire plan for each forest, each region and the Forest Service. This is essential to segregate this expense element from the re-current seasonal fire force expense element.
3. We seem to have need for a better basis to present our request for funds to the Congress. It is proposed, therefore, that our fire activity program, currently expressed as "seasonal fire", be classified to relate to all fire activities other than suppression, except the pro-rata regular P&M funds for yearlong Regional Office and Supervisor Office personnel assigned to fire activities and their related expenses.

Seasonal, I prefer to call it "project fire" funds should include the following expense elements:

a. Capital investment and replacement expense.

- (1) Structures
- (2) Heavy equipment
- (3) Communication
- (4) Other - perhaps mapping

b. Operating expenses:

(1) Directive or facilitating:

- (a) Law enforcement - fire prevention.
- (b) Communications
- (c) Training
- (d) Dispatching: Regional and forest (exclusive of ranger district)

(2) Direct:

(a) Seasonal force personnel:

Salary

Travel

Miscellaneous

4. Application of the foregoing through the media of Forest Service Manual policy and guide line instructions to stabilize policy Service-wide and thereby the pattern of use of "seasonal (project)" funds for "operating expense" purposes within which the initial attack forces problem assigned topic IBL is covered.

Again, my apologies for "treading" upon the financial aspects but without which it would appear to have been impossible to treat the subject.

Subtopic IBI - "Presuppression Forces"

1. Total man-months of season fire protection employees employed from P&M and Cooperative Funds.

FY 1945 - Reg.	I	II	III	IV	V	VI	VII	VIII	IX
Lookouts	: *1,891:	: 150:	: 375:	: (1) 586:	: 1,198:	: 1,300:	: 425:	: 124:	: 1,168
Firemen	: 572:	: -:	: 276:	: (1) 633:	: 807:	: 924:	: 212:	: 210:	: 350
Suppression Crew Members (Including Smokejumpers)	: 91:	: 350:	: 15:	: 139:	: 4,770:	: 627:	: -:	: 100:	: 335
Patrolmen	: 103:	: -:	: 10:	: (6) 116:	: 819:	: 602:	: 8:	:	:
Dispatchers	: 300:	: -:	: 37:	: 46:	: 694:	: 480:	: 71:	: 88:	:
Tank Truck Operators	: 33:	: -:	: 0:	: (2) -:	: (2) -:	: 81:	:	:	:
TOTALS	: 2,990:	: 500:	: 713:	: (3) 1,771:	: 8,288:	: 4,014:	: 716:	: 164:	: 1,853
Percentages - Base:	: 100:	: 100:	: 100:	: 100:	: 100:	: 100:	: 100:	: 100:	: 100
*Includes Aerial Observers									

FY 1953

Lookouts	: 651:	: 174:	: 298 (1) 633:	: 215:	: 927:	: 1,012:	: 257:	: 903:	: 747
Firemen	: 443:	: -:	: 302 (1) 655:	: 424:	: 638:	: 1,002:	: 172:	: 140:	: 327
Suppression Crew Members (Including Smokejumpers)	: 387:	: 425:	: 15 33:	: 229:	: 4,167:	: 761:	: -:	: 140:	: 14
Patrolmen	: 79:	: -:	: 16 1:	: 118:	: 953:	: 382:	: 3:	:	:
Dispatchers	: 348:	: 10:	: 52 112:	: 95:	: 668:	: 431:	: 102:	: 63:	:
Tank Truck Operators	: 102:	: -:	: 0:	: 3:	: -:	: 81:	: -:	:	:
Law Enforcement	:	:	:	:	:	:	:	: 36:	:
TOTALS	: 2,010:	: 609:	: 668 (4) 1,449:	: (8) 1,221:	: 7,353:	: 3,669:	: 534:	: 1282:	: 1,088
Percentages	: 67:	: 121.8:	: 203.2:	: 69:	: 88.7:	: 91.4:	: 74.6:	: 78.5:	: 58.7

93.7
(Total Avg. percentage 82.6 94.66%)

Note: See explanations (1 - 9) attached.

Note: Explanations and notations are referred to by parenthesized numerals.

** Man-months less than 1945 because of elimination of some lookouts and replacement with air patrol. Cost of air detection should be interpreted into man-months to have a current figure comparable to 1945. Our seasonal force fund cost of air patrol is \$76,940 for this column, although only \$56,315 is allotted at present.

- (1) Many of the lookouts in R-4 are lookout-smokechasers.
- (2) R-4 tank truck operators generally are foremen or members of suppression crews and included under "suppression crews". In R-5, "suppression crews".
- (3) R-4 "1945" total includes additionally, (a) Fire Control Staff officers - 53; (b) truck drivers, packers, etc. - 48; (c) warehousemen - clerks - 90; (d) communication - 60.
- (4) R-4 1953 total includes: (a) Fire Control Staff officers - 40; (b) truck drivers, packers, etc. - 18; (c) warehousemen - clerks - 22; (d) communications - 57.
- (5) R-4 needed total includes (a) Fire Control Staff officers - 46; (b) truckdrivers, packers, etc. - 74; (c) warehousemen - clerks - 34; (d) communication - 36.
- (6) R-5 position primarily used as a combination "fireman-patrolman".
- (7) R-5 has grouped firemen, suppression crews and patrolmen.
- (8) R-5 1953 total "Reduced man-months in spite of nearly 1/4 million dollar increase in coop. funds and addition of \$208,000 for fire protection from Flood Funds earmarked to two major watersheds.
- (9) Suppression Crew Members, for the most part, tractor-plow operators.

(9 - continued)

Patrolmen, used only in low visibility emergencies and are paid from FF. Dispatchers, not employed except on a few high fire occurrence districts. Dispatching done primarily by a Lookout-Dispatcher or the Ranger. Tank trucks manned on fires by men employed on other work, such as mechanics, and paid FF suppression.

To relate the above figures to those of other regions, it should be noted that while R-8 has fairly distinct fire seasons in the three Appalachian Mountain Forests, the other eight Forests experience near year around burning conditions and fire occurrence. An annual average of approximately 600 fires occur outside of the so-called fire seasons.

In addition to P&M and cooperative funds and varying with severity of fire years, from \$140,000 to \$200,000 of FF is used annually to close the gap between cost of minimum presuppression needs and the amount of regular funds available.

TRENDS IN PROTECTION STRENGTH
MECHANIZATION OF FIRE FIGHTING

By

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Division of Fire Control, R-8

Presented at

FIRE CONTROL CONFERENCE
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Topic I-B-2

MAJOR TOPIC I,
Sub-Topic B-2, Mechanization of Fire Fighting

To measure the extent by which the several main types of powered suppression equipment have been acquired by individual regions, there appears on Chart 1 figures of Forest Service inventories in 1944 and in 1952. This is augmented by inventories of like equipment available to national forests from cooperators or by hire.

Sheet 2 gives radio the same treatment.

It is quickly obvious that for the Service as a whole the suppression forces have been greatly strengthened both in powered equipment and in communications gear.

Due to the difference in problems and opportunities posed by topographic and other conditions found within the different regions, the types of equipment most effective in fire control must of course vary by regions. These charts are so arranged that any one region can note its own position of fire equipment availability with relationship to its suppression problems and needs.

The third chart tabulates for 1951 and 1952 by regions the number of Class B and larger fires (or theoretical opportunities to use some type of equipment), together with number and percent of those fires on which line building equipment was used and the amounts of line built by equipment.

I lack intimate knowledge of large areas of national forest lands and accordingly would not presume to judge how far towards the possible any one region has gone or should go in replacing hand tool fire line construction with powered equipment.

I am in position to present for consideration by this group some of the advantageous results which analyses show have accrued from the rather extensive use of power equipment in R-8. In presenting these data I do so with the knowledge that R-8 enjoys topographic and accessibility advantages over most regions, that many regions could not compete with our percentages of equipment-fought fires even though they had enough equipment on hand. I suggest, however, that to the degree conditions in any one area makes use of equipment feasible, proportionately like advantages may be attainable.

As a step in developing R-8's equipment experiences we have placed on Chart 4 the classes of equipment used, the ground cover conditions each class of equipment is best adapted for (expressed broadly in timber types), the width of fire line constructed and the average rate of production of satisfactory fire line per hour. To give you a clearer mental picture, I wish to run some slides which show the size and design of these line building units, and the stand and ground conditions where each is used.

Next we come to the fifth chart which shows our suppression results during three years preceding start of mechanization, and then over an eight year period, plots the effect on suppression expenditures, average area loss per fire and extra period fires as our equipment facilities increased.

To relate the fire job to funds, it was necessary to convert fire data to fiscal years. An important fact to note in considering this chart is that our fiscal books are not kept in a way which would permit segregating our suppression expenditures on equipment fires from the cost of hand tool fires. The figures include the cost of equipment-fought fires and also the cost of about 45% of our fires which were suppressed with hand tools. Costs involved in manpower suppression have gone up in the South in about the same proportion as elsewhere. That means that savings in suppression costs on equipment fought fires was considerably greater than Columns 4 and 5 indicate at first glance.

I wish it to be understood that in introducing figures comparative between R-8 and the remainder of the regions, I do so because by that process only can we assess the relative effects of equipment. Direct comparisons would not be statistically possible. Column 4 indicates that cost savings on the equipment fires have been great enough to absorb the universal inflation of unit costs in the many categories and hold our total suppression costs roughly equal to those of five prior years. Column 5, when compared with Column 1, does reveal that we are spending for suppression a significantly decreasing portion of the total FFF expenditure.

Considering that a prime objective of fire fighters is to reduce size of burned area and resource losses, the burned area figures are perhaps more significant than the expenditure figures. Even with nearly one-half the fires hand fought, the results obtained by equipment on the other half of the fires has been so great as to cut the national forest burned area per average fire to around 25% of their former average size. The figures in Column 15 fluctuate with hard and easy seasons, but still they show no downward trend.

Because of local conditions frequency of extra period fires is not comparable nationally. Within R-8 something has happened to eliminate proportionately around 75% of the fires which used to carry into the second burning period. Our studies show that change is largely a product of power equipment effectiveness.

Questions which naturally follow: How much did our equipment cost us? How well have investments in equipment payed off?

Our fire tractors, plows, transports and tankers represent a cash investment of \$407,000 from CY 1944 through 1953. Additionally, we started out by transferring some old but serviceable CCC trucks and tractors to fire duty. Their value then was not appraised, but it was around \$40,000. All of those units have since been replaced through the EOR&R process.

One can deduce relative results from the figures on this chart. Without equipment it is probable that our suppression costs today would be between two and three times what they are. We are coming pretty close to recapturing the amount of our equipment investment every year in reduced suppression costs.

Without fire line equipment we would on a conservative judgment basis be burning more than an additional 60,000 acres per year. I say that is conservative because with the fuel build-ups which have followed long protection, hand tool suppression has become more difficult and less effective each year. Also, in many of our areas manpower is no longer available locally in the strength required to handle our numbers of fires.

If we accept our judgment figure as to the additional area which would be swept by wild fire, then we find that the value of reduction in tangible fire losses annually exceeds the amount we have invested in equipment.

Now we move on to Chart 6, which deals only with fires on which line building equipment worked during CY 1951. Most of those 1430 fires had all their fire line plowed. Other of these fires were controlled by various combinations of part equipment-built line, and part line which had to be built by hand. There are included fires in the Ouachita, Ozark, Talladega and Appalachian Mountains; also, a few fires which were partially in flatwoods swamps. All of these fires burned under conditions of relatively fast rates of spread.

A considerable part of the credit for reduced burned area, and the fast control times shown on the right side of this chart, is tied to the figures under Report of Attack.

Simply stated, with mobile equipment units requiring only a few men to operate it, effective attack on a fire is underway, and consequently the control action has usually been completed in less time than it takes to alert and assemble a hand tool crew strong enough for the job. Our equipment attack and the smoke jumper operations in the West, while employing different methods, have common characteristics. They both overcome delays and lost motion inherent to mobilization of large manpower crews, and they deliver effective forces on the fire line quickly.

It is that quick attack following report— 60% of the fires attacked within 35 minutes, 88% of the fires within 1 hour and 15 minutes — which results in the head of a fire being stopped while the fire is still relatively small.

Occasionally we have more fires at one time on an isolated ranger district than the number of equipment units can properly handle. Then the least threatening fires just have to await their turn. Also, we have a few hundred fires which are set during the night and which require more time to attack.

Given fast attack time, and equipment which can build effective line faster than forty to sixty good men (according to ground cover), and the attack to control time melts away.

In the righthand columns, you will note that one-half of these fires were controlled within 35 minutes of arrival of crew, that within one hour, 79% of the fires were stopped and that less than 3% of the fires were still burning three and one-half hours after attack. From there on control time drags out in proportion to the amount of line on which equipment cannot work.

To give a clearer relationship between these figures on control time and the potentials for fast fire spread in our fuels, and in turn better evaluate the suppression effectiveness of the equipment, it should be noted that despite the relatively short burning time of these fires, their final size ran 65% Class B and 35% Class C and larger.

Another benefit of moment is the greatly reduced amount of time rangers and project men now divert to suppression and the reduced disruption of the other activities on districts and forests so equipped that a few men can handle most fires with confidence and dispatch.

A number of analyses have been made from time to time on equipment districts to reveal results. There is not time available here to present those in detail. I can say that they establish that equipment installations are accompanied by: reduced percentages of fires reaching the higher cost classes; greatly reduced amounts of man hours per fire required for mop-up; near disappearance of the "job fire"; small percentages of Class D and E fires; about 15% of the number of man hours previously required per fire and about 25% of the dollar cost when hand labor is used.

Extensive use of suppression equipment has driven us to change our basic concept of planning fire attack organization, and it should be mentioned here. In the early stages it was natural to assume that power equipment was in the role of "supporting to a hand tool-type of organization."

On fires where the proportion of equipment-built line is small, the concept of equipment in a supporting role is still sound. However, on terrain where most of the fire line can be built with equipment and where equipment units are or will be available in effective strength, our experiences add up to the conclusion that the most effective organization is one which uses the equipment unit (a unit consists of both the machine and its balanced operating crew), as the basic planning element.

Specifically, for a given fire suppression job and with known production performance of an equipment unit, the action is calculated in terms of numbers and placement of equipment units; the manpower used is in the role of "supporting the equipment" and is calculated in such strength and so organized as to perform the supporting jobs.

This change in planning concept carries on into the overhead or supervisory force. The requirements and performance of the fire boss and his helpers undergoes a radical change. The tempo of the action is stepped up to where there seldom would be time available to import overhead. The many problems created by gathering, transporting, camping and organizing large numbers of men are so reduced that many overhead positions common to large fire organizations can be eliminated and their duties assigned to a few multi-function persons.

The operation of this form of suppression organization has the further effect of reviving or supporting the basic Forest Service concept that "the local land manager manages all of his activities." Where mechanized equipment can be used effectively and is available, our key man, the district ranger, is placed in a position where he can in fact personally head up and direct all but the very unusual suppression actions on his district. Further, the more lucrative returns available from fast equipment attack are attainable only when the forest administrative officer on the ground becomes competent to and does plan, organize for and effect immediate and intelligent employment of his equipment. The "Project Fire" then becomes markedly less common.

COLORED SLIDES-- TOPIC I, Sub-Topic B-2

To highlight this equipment, I will start with our light Ranger Pal Plow, pulled by a 20 HP Cletrac and carried on a 1 $\frac{1}{2}$ -ton truck with special body and not usable on stony ground:

1. The plow- rear view.
2. The plow- side view.
3. Plow and tractor
4. Complete plow, tractor -truck unit.
5. With tilt bed trailer transport.
6. Open wire grass longleaf.
7. Scrub oak thicket.
8. Line through brush understory.
9. Line through light understory.
10. Running line through wire grass.
11. How wire grass burns.
12. Line through thin second growth pine.
13. Typical sparse slash pine second growth.

SUPER PAL DISC PLOW

14. Plow- deadheading position.
15. Unit D-6 tractor transport.
16. Line construction.
17. Line construction open area.
18. Typical cover density.
19. Loblolly pole stand and line.
20. Slash pine. Line. Heavy grass/needle.
21. Medium plowing conditions.
22. Medium plowing conditions.
23. " " "
24. " " "

HEAVY DISC PLOWS

25. The plow.
26. Plow and 35 or equal tractor.
27. Plow-tractor-transport- showing loading ramps.
28. Ready to roll.

WORKING CONDITIONS

29. Dense slash pine saplings.
30. " " " advanced reproduction.
31. Fairly dense shrub understory.
32. " " palmetto understory.
33. Slash pine over Palmetto.
34. Line through heavy cover.
35. Line through Pole-Palmetto.
36. Line through heavy flash fuels.
37. Line through heavy needle accumulation.

38. Plowing towards dense young growth.
39. Line through " " "
40. " " " " "
41. Typical heavy going.
42. Ground conditions - sawlog stand.
43. Natural slash pine reproduction.
44. Natural longleaf reproduction stand.
45. How this flash fuel burns - no wind.
46. A Florida fire- 6 mile shot.
47. Plowing flank of above fire. Heavy fuel.

(Incidentally, 3 plow units controlled this fire in 2 hrs.12 min.
at 145 acres.)

MOUNTAIN- Stony ground equipment

48. Appalachian Mt. topography.
49. More topography.
50. " "
51. Mt. fuels burning at night.
52. " " " " "
53. Plow and tractor.
54. Another type mountain plow & transport.
55. Plow at work. 44% side slope. Hardwood young growth.
56. " " " 36% " " Pine-Hwd, mixture.
57. Plowing up 31% slope. Hardwoods.
58. Backing up 40% slope to plow down.
59. Mountain shortleaf pine.
60. Location plowed line - plow country.
61. Plow country.
62. Line along pine ridge.
63. " " hardwood slope.
64. " " rocky ridge.
65. " through stony ground.
66. " down stony slope.
67. Ridge line.
68. Line along shortleaf pine slope.
69. Typical young shortleaf-plowed line to right.
70. Line along rocky hardwood slope.
71. Men walking down plowed line. Hardwood Mt.

FIRE CONTROL EQUIPMENT AVAILABLE

	BULL DOZERS				TRACTOR PLOWS				TANK TRUCKS				AIR CRAFT				PORTABLE PUMPERS				POWER SAWS			
	F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR	
	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952
R-1	71	30	134	447	1	4	22	50	13	41	5	24	-	2	14	38	147	123	17	48	17	179	35	571
R-2	40	40	80	120	2	2	-	-	6	11	10	30	-	-	10	50	10	40	15	45	4	40	50	200
R-3	5	34	34	102	-	9	4	2	-	4	4	15	-	8	8	27	10	2	2	14	-	17	17	191
R-4	2	5	60	190	1	-	-	-	3	18	25	52	-	1	10	30	83	75	4	4	5	40	15	50
R-5	19	20	152	559	-	1	-	2	144	242	167	485	-	4	7	77	104	168	26	56	3	37	45	534
R-6	3	25	999	3879	20	11	-	-	17	154	200	555	-	6	105	³ * M	125	205	500	1033	3	200	100	6,000
R-7	-	1	12	45	-	-	-	-	3	13	6	18	-	-	2	15	43	34	10	22	-	8	-	90
R-8	-	18	10	100	24	122	15	150	10	16	25	20	-	-	15	²⁰ * M	6	8	3	10	-	-	5	200
R-9	21	27	71	238	48	45	18	27	37	48	26	54	1	3	26	48	126	123	35	57	-	13	30	504
TOTALS	161	200	1552	5580	96	194	59	231	233	547	468	1253	1	24	197	³⁰⁸ * M	654	778	612	1289	32	534	297	8340

* Military Aircraft Available

FIRE CONTROL EQUIPMENT AVAILABLE RADIO

	FIXED SETS				VEHICLE INSTALLATIONS				HAND & PACK			
	F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR	
	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952
R-1	235	313	-	-	9	57	-	-	-	313	-	-
R-2	5	125	10	20	6	95	100	200	100	125	10	20
R-3	-	92	-	5	-	44	-	25	158	314	-	-
R-4	20	120	20	33	-	15	-	50	150	290	-	-
R-5	208	405	3	82	54	483	33	305	512	640	-	71
R-6	100	581	-	500	20	220	300	600	360	470	-	559
R-7	43	61	-	6	-	16	-	42	61	128	-	28
R-8	104	238	-	50	64	368	-	100	140	238	-	50
R-9	128	176	-	8	6	93	-	28	220	289	-	16
TOTAL	843	2111	33	704	159	1391	433	1350	1701	2807	10	744

USE OF LINE BUILDING EQUIPMENT

C. Y. 1951

REGIONS	1	2	3	4	5	6	7	8	9	1-9
Number Fires Class B & Larger	188	113	512	152	595	242	131	2,376	551	4,760
Number Fires Bulldozer Used	27	8	38	25	171	61	-	1	6	337
Number Fires Tractor-PlowsUsed	-	1	-	1	-	9	-	1,556	49	1,616
Number Fires Equipment Used	27	9	38	26	171	70	-	1,557	55	1,953
Percent B plus Fires Equipment Built	14.4	7.9	7.4	17.1	28.7	28.9	-	65.6	10.0	41.0
Chains Fire Line Equipment Built	907	736	10,411	2,161	21,139	7,279	-	69,625	2,164	93,283

C. Y. 1952

Number Fires Class B & Larger	232	193	461	182	450	328	313	2,535	1142	5,836
Number Fires Bulldozer Used	35	23	4	8	94	77	-	21	22	284
Number Fires Tractor-Plows Used	1	5	10	-	-	12	-	1,266	180	1,474
Number Fires Equipment Used	36	28	14	8	94	89	-	1,287	202	1,758
Percent B plus Fires Equipment Used	15.5	14.5	3.0	4.4	20.9	27.1	-	50.8	17.7	30.1
Chains Fire Line Equipment Built	1,744	1,792	234	366	4,422	3,764	-	46,247	7,025	65,594

PRINCIPAL TRACTOR PLOWS - R-8

AVERAGE PRODUCTION FACTORS

TYPE EQUIPMENT	TIMBER TYPE	AVG. WIDTH LINE INCHES	CHAINS CONSTD. PER HOUR	LBS. DRAW BAR PULL
H G 42 CLETRAC RANGER PAL PLOW	Long Leaf Ridge	92.3	171.0	880
	Loblolly Hardwoods Light Understory	80.0	170.0	1231
H G 42 CLETRAC ANDERSON 2 DISC PLOW	Long Leaf Ridge	62.3	213.9	997
	Loblolly Hardwood	45.0	191.3	1383
T D 6 SUPER PAL PLOW	Long Leaf Semi-Dense	84.2	116.3	1895
T D 9 MATHIS PLOW (Hand Lift)	Long Leaf Dense Understory	82.0	167.7	2117
	Loblolly Hardwood Dense	86.0	134.8	3171
	Long Leaf Dense Understory	84.0	148.8	2650
H G 42 CLETRAC TALLADEGA PLOW	Appalachian Hdws.	41.0	97.1	1263
	Mountain Short Leaf Hardwoods	47.0	86.4	1220

SATISFACTORY LINE — CAN BE BACK FIRED FROM ON HIGH CLASS 4 FIRE DAY

MAXIMUM GRADES PLOWED AND MEASURED IN MOUNTAINS

Plowing Up-slope 40 % Grade
 Plowing Down-slope 67 % Grade
 Plowing Side-slope 49 % Grade

EFFECT FIRE LINE EQUIPMENT

F F F SUPPRESSION EXPENDITURES

BURNED AREA SIZE OF FIRES R 8

ALL OTHER REGIONS

F.Y.	SERVICE WIDE (Col-1)	REGION 8			PERCENT SERVICE WIDE FFF FOR SUPPRESSION-R 8 (Col-5)	NUMBER FIRES B & LARGER (Col-6)	ACRES BURNED N F (Col-7)	BURNED PER B + FIRE (Col-8)	TOTAL ACRES BURNED INSIDE (Col-9)	BURNED INSIDE PER B + FIRE (Col-10)	EXTRA PERIOD FIRES (Col-11)	PERCENT FIRES COLUMN 6 CLASS C OR LARGER (Col-12)	ACRES BURNED INSIDE (Col-13)	NUMBER FIRES CLASS B & LARGER (Col-14)	ACRES BURNED INSIDE PER CLASS B PLUS (Col-15)	EXTRA PERIOD FIRES (Col-16)
		E O R & R (Col-2)	OTHER (Col-3)	TOTAL (Col-4)												
1945	\$ 1,787,311	\$ 32,340	\$ 132,317	\$ 164,657	9.27	2,193	47,740	21.77	79,033	36.04	11	45.7	191,375	2,505	76.39	126
1946	3,516,204	55,647	148,668	204,315	5.81	2,437	33,687	13.82	51,642	21.19	—	39.8	236,225	3,548	66.58	187
1947	3,770,692	68,880	153,053	221,923	5.88	2,911	44,487	15.28	70,655	24.27	8	38.2	92,685	4,977	18.62	102
1948	4,895,614	63,845	135,315	199,160	4.07	2,158	25,467	11.80	40,764	18.89	6	32.9	161,056	2,239	71.93	112
1949	3,247,364	54,008	131,764	185,772	5.72	1,754	14,861	8.47	27,746	15.82	6	32.7	161,733	3,089	52.36	75
1950	7,420,645	88,258	193,159	281,417	3.79	2,174	28,408	13.06	48,038	22.09	4	34.9	198,916	2,641	75.32	142
1951	6,474,180	83,852	125,466	209,318	3.23	2,485	29,748	11.97	46,534	18.72	8	29.6	372,750	2,358	158.08	120
1952	8,515,763	68,470	128,315	194,785	2.29	1,993	20,544	10.30	33,246	16.68	4	26.9	272,425	3,872	70.36	99
	PRE-MECHANIZATION R-8 F.Y.															
	130 C C C CAMPS				1941		2,542	86,349	33.97	100,034	39.35	9	45.0			
	75 C C C CAMPS				1942		2,455	118,935	48.47	190,845	77.74	20	47.2			
					1943		3,234	154,828	47.87	226,045	69.90	36	47.4			

RESULTS C. Y. 1951

1430 EQUIPMENT FOUGHT FIRES INSIDE R-8 FORESTS

LAPSED TIME INTERVALS		REPORT TO ATTACK		ATTACK TO CONTROL	
HRS.	MINS.	NO. FIRES ATTACKED WITHIN	% OF FIRES ATTACKED WITHIN	NO. FIRES CONTROLLED WITHIN	% FIRES CONTROLLED WITHIN
	20	459	32.10	418	29.23
	25	626	43.78	518	36.22
	30	759	53.08	637	44.55
	35	870	60.84	733	51.26
	40	966	67.55	816	57.06
	45	1,042	72.87	893	62.45
	50	1,097	76.71	935	65.38
	55	1,150	80.42	994	69.51
1	—	1,190	83.21	1,044	73.00
1	15	1,269	88.74	1,130	79.02
1	30	1,328	92.87	1,202	84.05
1	45	1,358	94.97	1,242	86.85
2	—	1,375	96.15	1,293	90.42
2	15	1,393	97.41	1,329	92.94
2	30	1,403	98.11	1,344	93.98
2	45	1,414	98.88	1,353	94.62
3	—	1,420	99.30	1,373	96.01
3	15	1,423	99.51	1,382	96.64
3	30	1,425	99.65	1,389	97.13
3	45	1,427	99.79	1,398	97.76
4	—			1,403	98.11
4	15			1,405	98.25
4	30			1,408	98.46
4	45			1,411	98.67
5	—			1,415	98.95
5	30	1,428	99.86	1,416	99.02
6	—	1,429	99.93	1,418	99.16
6	30	1,430	100.00	1,420	99.30
7	—			1,421	99.37
7	30			1,423	99.51
8	—			1,423	99.51
9	—			1,427	99.72
10				1,428	99.79

EFFECTIVENESS OF SUPPRESSION ACTION

THE INITIAL ACTION PHASE

By

Chalmer K. Lyman, Supervisor,
Lolo National Forest, R-1

Presented at

FIRE CONTROL CONFERENCE
Ogden, Utah, February 1954

Topic I-C-1

EFFECTIVENESS OF SUPPRESSION ACTION

THE INITIAL ACTION PHASE

In studying the initial action phases of suppression I have investigated the types of detection, speed of discovery, reporting time, elapsed time from report to arrival of first attack forces, strength of first attack, elapsed time for arrival of first reinforcements and strength of first reinforcements. I have studied 4263 Region I and Region V fires attempting to analyze the effects of, (1) reductions in the number of ground lookouts, (2) air-ground detection, (3) cooperator action, (4) quality and quantity of manpower and, (5) overall fire control management.

To make an analysis which will best reflect the current effectiveness of initial suppression action, I have directed most of my attention to the critical fires which can or do get away to cause costly control. In the critical fire category, I included all Class B and larger fires plus the Class A fires which start spreading at a dangerous rate threatening to run out of control. The Class A fires which lay quietly waiting for suppression forces and would not "blow-up" even if there were delays of many hours are not included. Such fires do not have a major influence on the success of fire control. The percentage of total fires that can be classed as critical vary with differences in fire season, occurrence, fire locations, etc. In Region I the percentages vary by years from 15 to 40. For example, on the Lolo Forest during 1953 with a drier than average August, 40% of all fires were critical. In 1950, which was an easy season, only 24% were critical. The percentages for Region 5 fires also vary considerably from year to year although consistently the proportion of critical fires is much greater than in Region I.

You may well ask why I place so much emphasis on these so-called critical fires. I do because I think the success of fire control depends mostly upon our effectiveness in suppressing these dangerous fires. Certainly we must control all fires as promptly as possible, and surely fire control management must be geared accordingly, but to attain acceptable results we must devote our greatest efforts and attention to the fires which can burn us out if we fail to provide strong, aggressive action. I am sure we should study these critical fires much more intensively than we have in the past and then base more of our fire planning and action on the needs indicated by such studies. If we do this, there will be a marked improvement in the efficiency of fire control.

DISCOVERY OF FIRES

In Region I the discovery of fires from 1940 to 43 was considerably different than it was during the 1950-53 period.

Figure I shows that whereas 68% of the critical fires in 1940 to 43 were discovered by lookouts and aerial observers, only 47% were discovered by those detectors in the 1950-53 period. In my opinion the 21% decrease in discoveries by the organized detection force is due primarily to, (1) smaller number of ground lookouts, (2) inadequacies of air-ground detection, (3) less efficient detection from lookouts and, (4) occurrence of more fires during late fall when few lookouts were manned. On the Kaniksu and Lolo Forests in 1942 there were 170 regular lookouts included in the fire plan. In 1950 there were only 93. The reduction, amounting to 46%, is a major factor contributing to the decline of our initial fire control action. Another major influence involves the inadequacies of our air-ground detection systems. I believe in air-ground detection and am sincerely interested in seeing it develop, but I am sure we have much to learn before we know enough to manage it properly.

During 1953 with air-ground detection used for the entire Kaniksu and for four out of seven districts on the Lolo there were only 55 ground lookout stations included in the class 70 organization. Fifty-three lookouts had been eliminated by air-ground detection planning. Results indicate that aerial observers are not discovering anywhere near the number of fires that used to be discovered by the lookouts which were abandoned. In 1953 the air observers discovered only 9% of the critical fires. They need to make prompt discoveries on more than twice as many of those fires, if we are to raise our effectiveness to the 1940-43 level. This evidence indicates a need for careful study of the whole air-ground detection problem. First of all we need to find the proper balance between number of ground stations and frequency of aerial observing. Then we need to develop observing skills. The studies can be made and the answers found at reasonable cost. All we need to do is make up our minds that the job is important enough to justify scheduling the work.

I do not consider lookout detection efficiency too important as a factor responsible for fewer lookout discoveries. I am well acquainted with both forests included in this study and am sure the lookouts are just about as good now as they were in the past. We have man and wife combinations, women lookouts and a few outstanding young men who are as good or better than the outstanding lookouts in 1940 to 43. I think training is still about as intensive. Certainly the district overhead responsible for training and supervision is stronger than it was 10 to 13 years ago.

One other minor reason that fewer fires were discovered by lookouts in the 1950-53 period was that more fires occurred during September, October and November, after lookout stations were closed. Both 1952 and 1953 were abnormally dry Falls in Region I. Experience during those two dry Falls proved that more intensive detection is needed during such unusual periods.

DISCOVERY TIME

Figure II shows that 1940 to 43 fires were discovered sooner after origin than the 1950 to 53 fires. In the early 40's 38% of the critical fires were discovered within 30 minutes. Only 23% were discovered that soon during the 1950-53 period. Certainly the difference of 15% is significant. Of several possible reasons for the difference only one—the major alteration of our detection system—seems to be highly important. With fewer lookouts occupied, with increased aerial detection and with more fires being discovered by outsiders, delays in discovery time are bound to occur. Aerial observers cannot pin point lightning fire locations as storms occur, nor can they quickly discover all man-caused fires. Elapsed time for discoveries made by cooperators cannot help being delayed often simply because most laymen will not devote the interest and attention that our own employees do.

A reduction of elapsed time for discoveries is dependent mostly upon the development of more realistic air-ground detection plans. I am sure we need to man more ground stations. Incidentally, I would be defaulting here if I did not mention that we need more money to finance a stronger detection organization.

REPORT TIME

Figure III shows that reporting time for critical fires is slower nowadays. Fourteen percent fewer fires are being reported within 10 minutes; 17% fewer are reported within 30 minutes. Experienced dispatchers will tell you there are numerous and varied reasons for the delays in this phase of initial action.

First: Dispatchers cannot obtain satisfactory locations and other pertinent information on fires without taking more time to investigate the reasons.

- (a) With fewer lookouts cross shots cannot be obtained for as many fires. This has the most serious effect when there is need to unscramble the mass of information that pours in during a lightning fire "bust".
- (b) Discoveries are made at greater distances with the results that lookouts are less certain of their observations and small errors in azimuth readings are amplified to create significant discrepancies in location.
- (c) With 16% more fires being discovered by cooperators, dispatchers obtain less complete information than they would from lookouts.

Other reasons for slower report time are:

1. Present manpower conditions do not permit rapid dispatcher action

when there is an overload of fires. Reports to firegoers can be made quickly when there is a normal occurrence but with an overload, Forest Service initial attack forces are dissipated. Then action on later fires must be delayed until cooperator or FF crews can be assembled. Alert dispatchers—knowing that initial attack forces are limited—often delay reporting to firegoers until they have had time to judge the potentialities and decide which fires require the most aggressive action. This, I believe, is good management.

2. Report time for smokejumper fires is delayed by dispatching complications. For the Lolo and Kaniksu smokejumper fires classed as critical, report time was 10 minutes or less for only 19% and 30 minutes or less for 36%. These figures compare with 49% and 70% for all critical fires on those forests.

Orders for smokejumpers must be relayed from district dispatchers to forest dispatchers to the smokejumper loft. Then the loft dispatcher must decide what jumpers to assign and relay information to them. Delays are frequently caused by long distance phoning or transmission of radio messages. A good percentage of requests for jumpers are made too late in the day for jumping. In such cases, reports to the jumpers frequently are delayed until early morning hours. Also, reporting delays sometimes result when jumper forces are exhausted and action is postponed until men return from previous assignments.

3. Some of the delay in reporting time is believed to be caused by a let down in morale. During the early 40's most trained firemen possessed that well-known "minute man" attitude. They respected the slogan "Minutes count. Let's go!" Considerable emphasis was placed on a report time standard of 10 minutes.

We still try to act promptly and aggressively particularly when critical fires are concerned but somehow we just do not possess quite the same spirit we used to. I feel a difference. I am sure many of you in this room do too.

4. The fact that cooperators make a larger percentage of discoveries also tends to increase reporting time. Frequently such people must travel some distance to a phone before they can report. And many laymen, not appreciating the need for speed, delay action longer than a fire control man would. So here again the reduced number of lookout stations shows an adverse effect.

5. The quality and qualifications of lookout personnel and dispatchers may have some deterring effects on reporting time. But I do not consider this a major factor.

6. Replacement of telephones by radio may have had some slight influence on report time. On the Kaniksu and Lolo Forests we are in the pioneering stages of radio communication. We have not learned to use the air in an orderly, efficient manner. As a result, some reports are delayed because lookouts have to wait to get on the air.

STRENGTH OF FIRST ATTACK

The speed and strength of attack for Class B and larger fires on the Klamath, Sierra and Los Padres Forests of Region V have declined sharply since the 1940 to 43 period. Figure IV shows the trend. From 1949 through 1952 only 46% of the Class B and larger fires were attacked within one hour after initial attack forces received their reports. During the 1940 to 43 period 63% were attacked within one hour. Figure V indicates a marked difference in the strength of first attack. During the 1949 to 1952 period six or more men were sent initially to only 21% of the Class B and larger fires. For the 1940 to 43 period six or more men were sent as first attack forces to 44% of such fires. I am not well acquainted with the California fire control organization but my guess is that the differences are due mostly to a reduction in fire fighting forces. The effects of increased business and interest in activities other than fire control may be important too.

In Region I the speed and strength of initial attack do not seem to have changed. Figure VI shows there is little difference in speed of attack and Figure VII indicates that strength of initial attack has not changed significantly.

Actually, I think there is a shortage of strategically placed fire-goers in Region I and the weakness will cost us dearly when critical fire seasons occur at frequent intervals as they did from 1910 through 1940. We are getting by now during easy years, but we will suffer some real disasters during critical years if we do not strengthen our initial attack forces.

Of course, not all of the weaknesses can be attributed to a shortage of manpower. Travel to fires has been somewhat restrained as a result of our safety program. For example, during the 1950-53 period travel to fires discovered at night was delayed until morning for reasons of safety on 39 Lolo fires. In the 1940-43 period action was delayed similarly in only 13 cases. We need to take a critical look at these cases where travel is postponed because of darkness and determine if we are doing too much of it. I think we are.

Influences of the 40 hour week, overtime, and the general trends of a "jet age" reaching beyond the sound barrier all combine to complicate our task of "hitting" fires fast and hard. Yet, actually all is not bad. We have made some progress.

We make better use of our overhead than we used to. For initial action on critical fires, we rely more and more upon our key overhead who are highly qualified fire men. A higher percentage of initial attack forces are comprised of these better men. Also, I believe our key men are more competent than they used to be. Improved suppression training, including in particular better fire behavior training, increased knowledge of fire behavior and assignment of greater responsibilities have improved the skills of our overhead fire men.

Improved equipment, facilities and service of supply all contribute to stronger initial attack. More and better fire tankers, increased use of radio, aerial delivery reducing the energy expended on back-packing, more frequent use of good bedding, hot meal delivery and numerous other improvements have all contributed to more effective initial attack. Certainly smokejumpers have done much to raise the caliber of early action on fires. With jumpers the more remote fires now can be reached faster with fresher men.

FIRST REINFORCEMENTS

I have included first reinforcements as an initial action phase because I believe reinforcement action often should be taken as a part of initial dispatching. Under good management small reinforcements should reach critical fires within a few minutes after initial attack.

Figure VIII shows that during the 1950-53 period 10% fewer fires were reached by first reinforcements within one hour after the initial attack than in the 1940-43 period. The same is true for percentage of fires reached within 2 hours elapsed time. Figure IX definitely shows that first reinforcement crews are smaller now than in the early 40's.

The slower arrival time for reinforcements and the smaller sized crews nowadays can be attributed mostly to a reduction in the number of organized forest service crews. We do not have the large CCC and BRC crews that were available in the early 40's. More and more we must rely upon cooperator crews and pick-up firefighters. Dispatching time and crew efficiency cannot help but suffer under such conditions.

First reinforcement action is vital to successful fire control. We know some fires will escape initial attack forces. If we are not prepared to strike fast and hard with competent reinforcements, the catastrophic fires responsible for major fire control disasters are certain to occur. Strengthening of first reinforcement action involves the next topic so I will not attempt to make detailed analyses and suggestions now but I do want to mention that here again is a fertile field for scientific studies. We do not know how many firegoers we should have according to fire danger nor do we know where best to station such forces. Small expenditures for sound research will produce rich results worth much to the progress of fire control.

SUMMARY

The investigations of initial action reveal evidence that there has been a general let down during the past 10 to 15 years in all phases of the job. The improvements made in training and fire fighting techniques have been more than offset by declines in morale, fire planning, management of cooperators and overall fire control administration. The dangers inherent in the losses of efficiency are serious enough to justify our devoting special effort and attention to the task of improving the planning and organization of initial action forces.

Our weaknesses in detection have resulted primarily from changes in our detection management. We have altered plans and systems cutting down the number of ground stations, and trying new techniques such as aerial detection. In all of this, we have proceeded without sufficient facts and knowledge. With management based upon empirical plans, mistakes were inevitable. Sure, we have learned and we have made progress, but we do not yet know the important right answers concerning detection. Nor will we know until we make up our minds to conduct searching, detailed, scientific studies designed to reveal the basic facts we must have. We need to study the masses of information contained in 929 reports to reveal the best evidence available. Then we need to establish realistic on-the-ground studies covering large areas, and testing various alternative methods to discover the degree and type of detection which will assure satisfactory results. Until we make such studies, we cannot know how best to keep out of trouble.

Our slow-up in fire reporting has developed partly because of our weakened detection organization and partly because of a let down in spirit. The first can be corrected to a large extent by the detection studies I have proposed. The latter can be corrected by good management which places proper emphasis on the need for speed and accuracy.

The decline in speed and strength of first attack has resulted primarily from the inadequacies of our firegoer organization. There are not enough trained smokechasers available and those we do have are not always stationed where they should be. Initial attack and early reinforcement action by cooperator crews are not as aggressive and effective as they could be if we devoted the time and attention we should to training and directing such crews. Complete correction of these weaknesses requires additional financing but great improvements can be made even with the facilities we have. The best opportunities for improving are offered by a research program designed to discover better methods of organizing the initial action fire fighting forces. In this activity as in detection, there are lucrative possibilities offered for obtaining many new and basic facts quickly. Of course, good research is not all that we need to do now to reverse the trends in fire fighting action. The manipulation of crews together with increased FFF expenditures for standby crews during periods of critical fire danger will go a long way toward strengthening our first attack and early reinforcement action. Also, a campaign designed to increase and improve cooperator participation should pay big dividends.

In closing, I would like to remind you that the opportunities for improving fire control are just as great now as they ever were. There is still much pioneering to be done, particularly in the field of initial action. The quickest, cheapest, and surest way to accomplish such pioneering is through organized study conducted by

experienced researchers. Until we accomplish the formal research necessary to reveal many basic facts concerning where, when and how we should use fire control personnel and facilities, we will have a difficult time making substantial progress.

I doubt that we will be very successful convincing Congress and the public of our need for larger fire control appropriations until we assemble factual information showing and proving that we know what manpower and facilities are needed to attain the most economical fire control.

Figure 1

**PERCENTAGE OF CRITICAL FIRES
DISCOVERED BY DIFFERENT
CLASSES OF PEOPLE**

KANIKSU & LOLO Forests

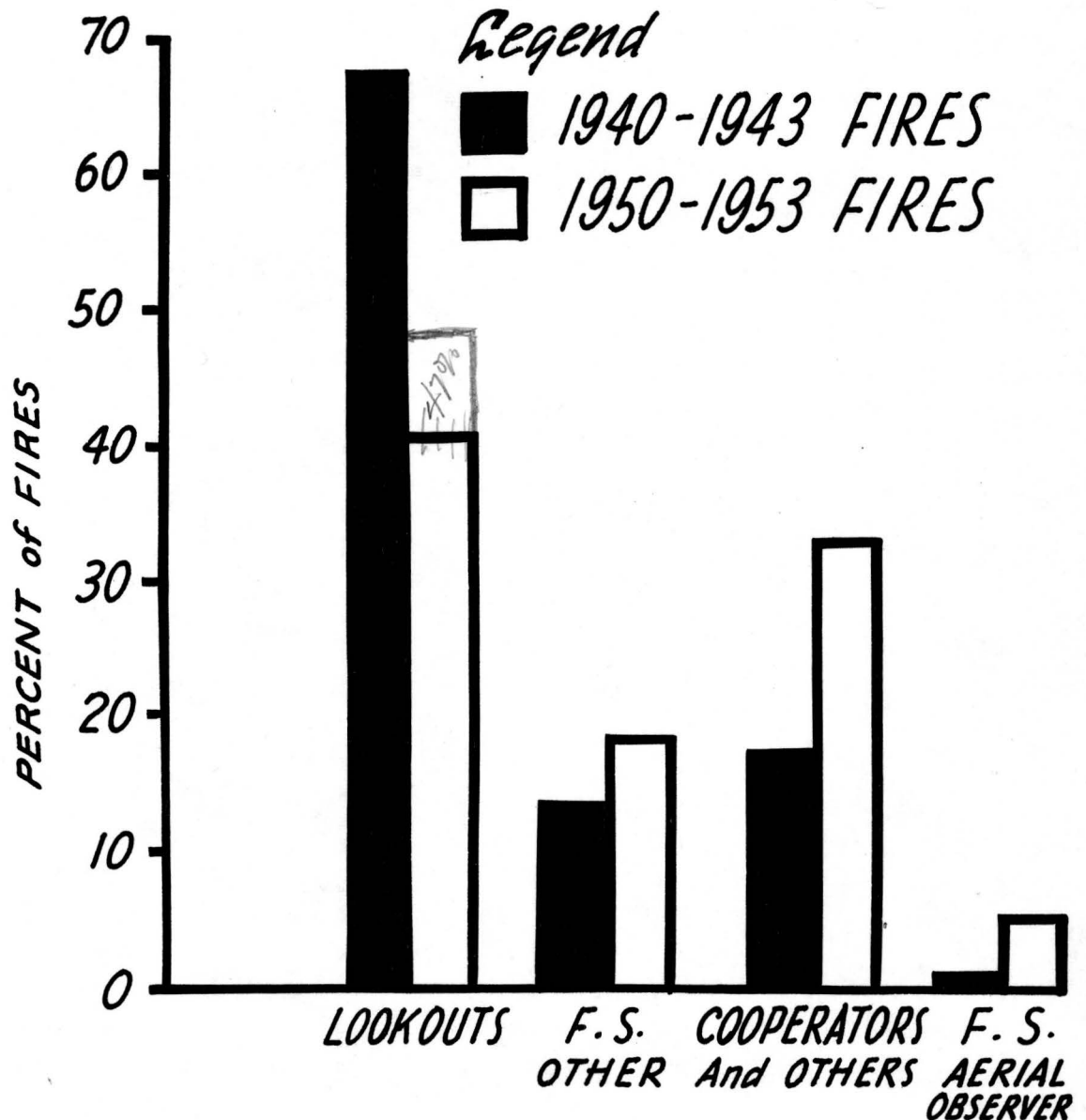


Figure 2

**PERCENTAGE OF CRITICAL FIRES
BY ELAPSED TIME FROM ORIGIN
TO DISCOVERY**

KANIKSU & LOLO Forests

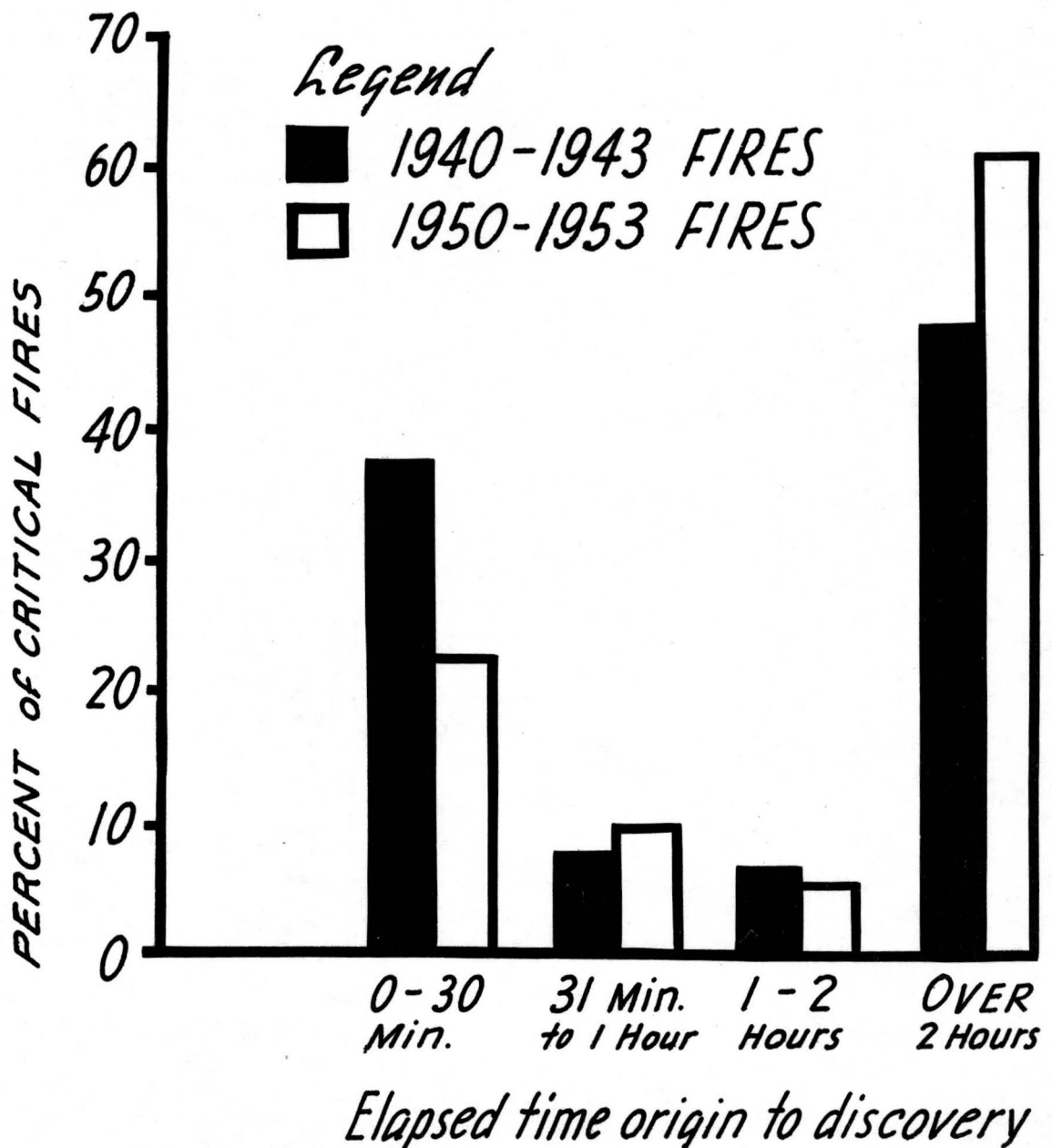


Figure 3

**PERCENTAGE OF CRITICAL FIRES
BY ELAPSED TIME FROM
DISCOVERY TO RERORTING**

KANIKSU & LOLO Forests

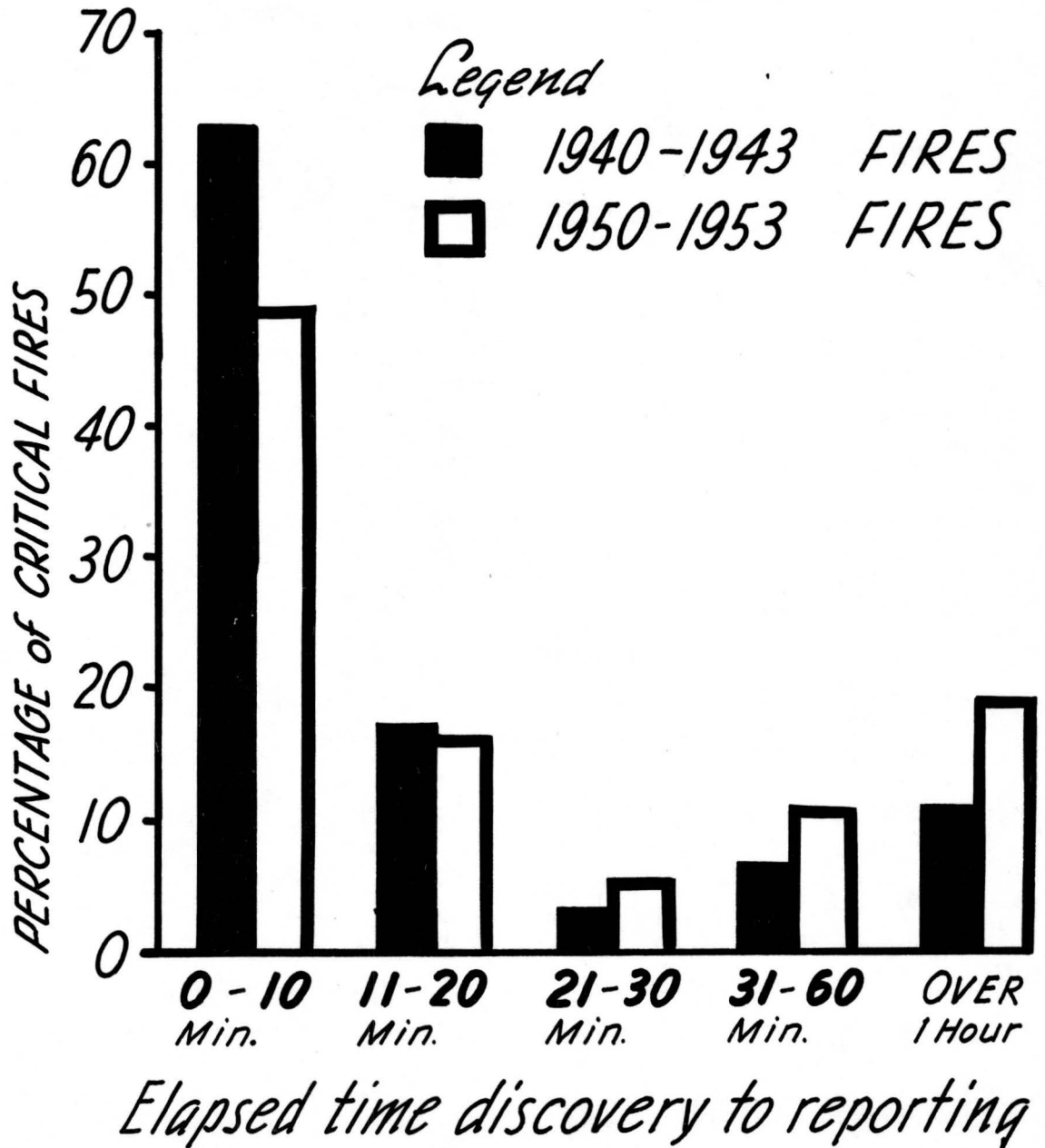
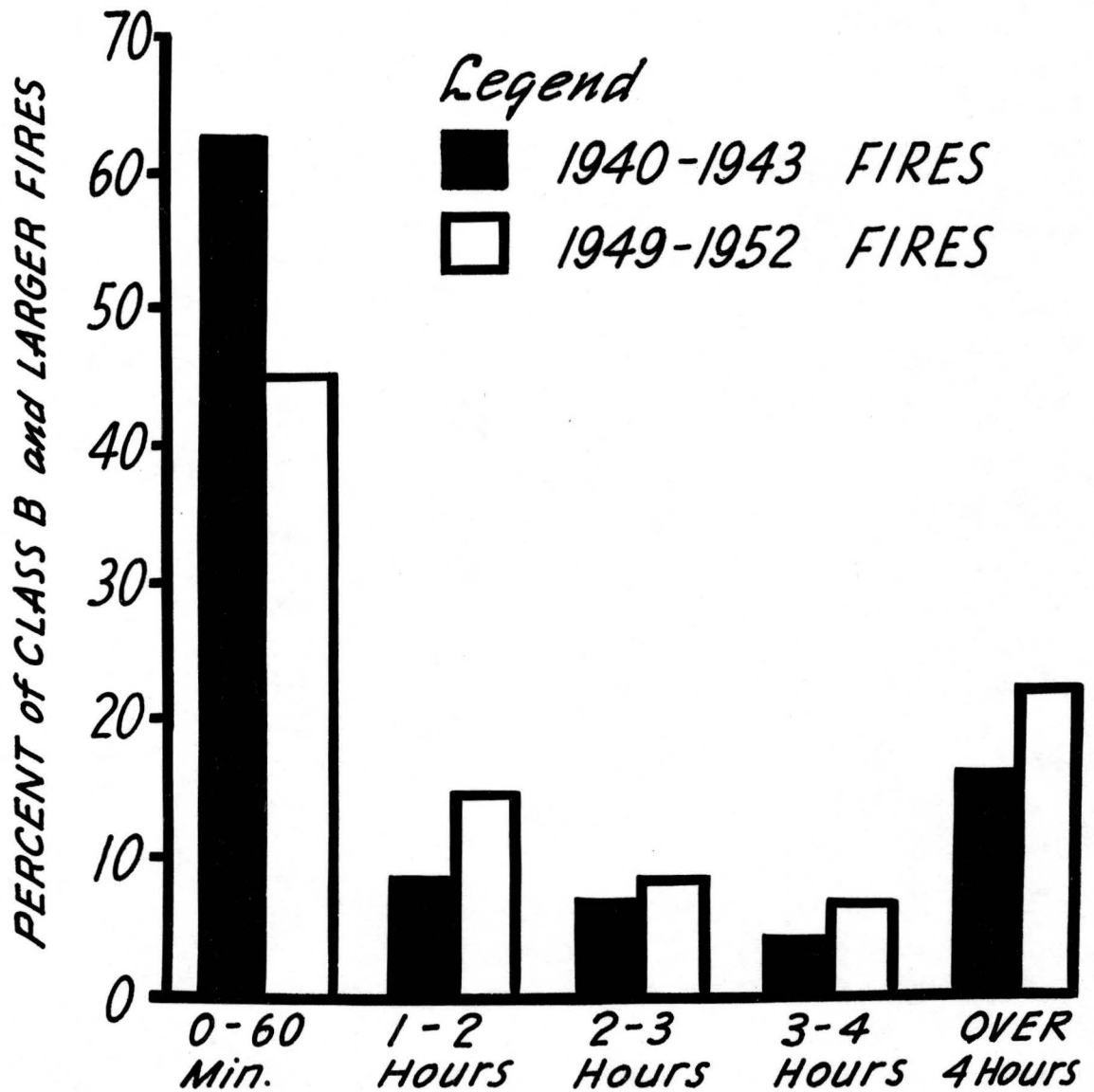


Figure 4

**PERCENTAGE OF CLASS B AND
LARGER FIRES BY ELAPSED TIME
FROM REPORTING TO FIRST ATTACK**

KLAMATH, SIERRA & LOS PADRES Forests



Elapsed time from reporting to first attack

Figure 5

**CUMULATIVE PERCENT OF CLASS B
AND LARGER FIRES BY NUMBER OF MEN
MAKING FIRST ATTACK**

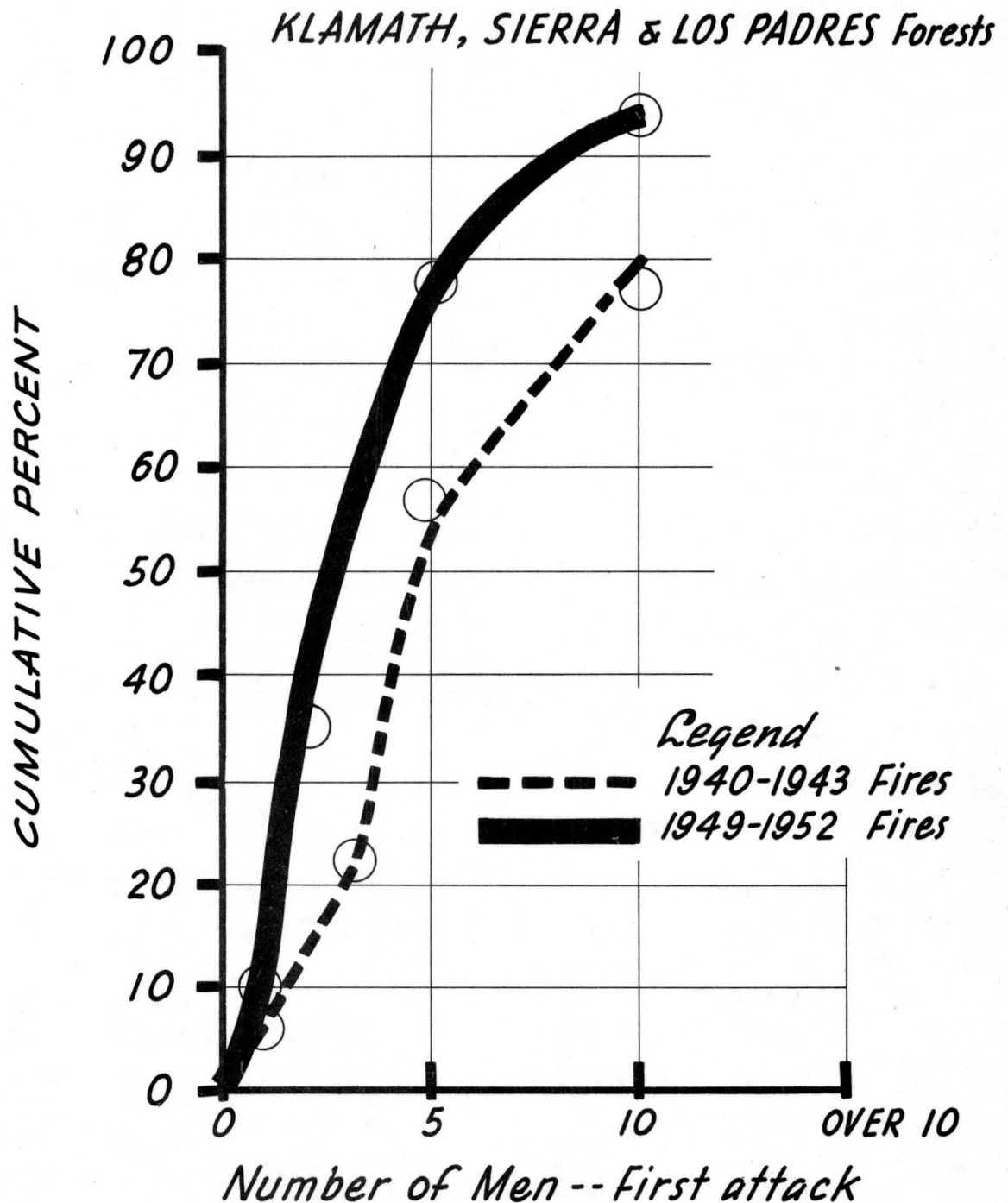


figure 6

**PERCENTAGE OF CRITICAL FIRES
BY ELAPSED TIME FROM
REPORTING TO FIRST ATTACK**

KANIKSU & LOLO Forests

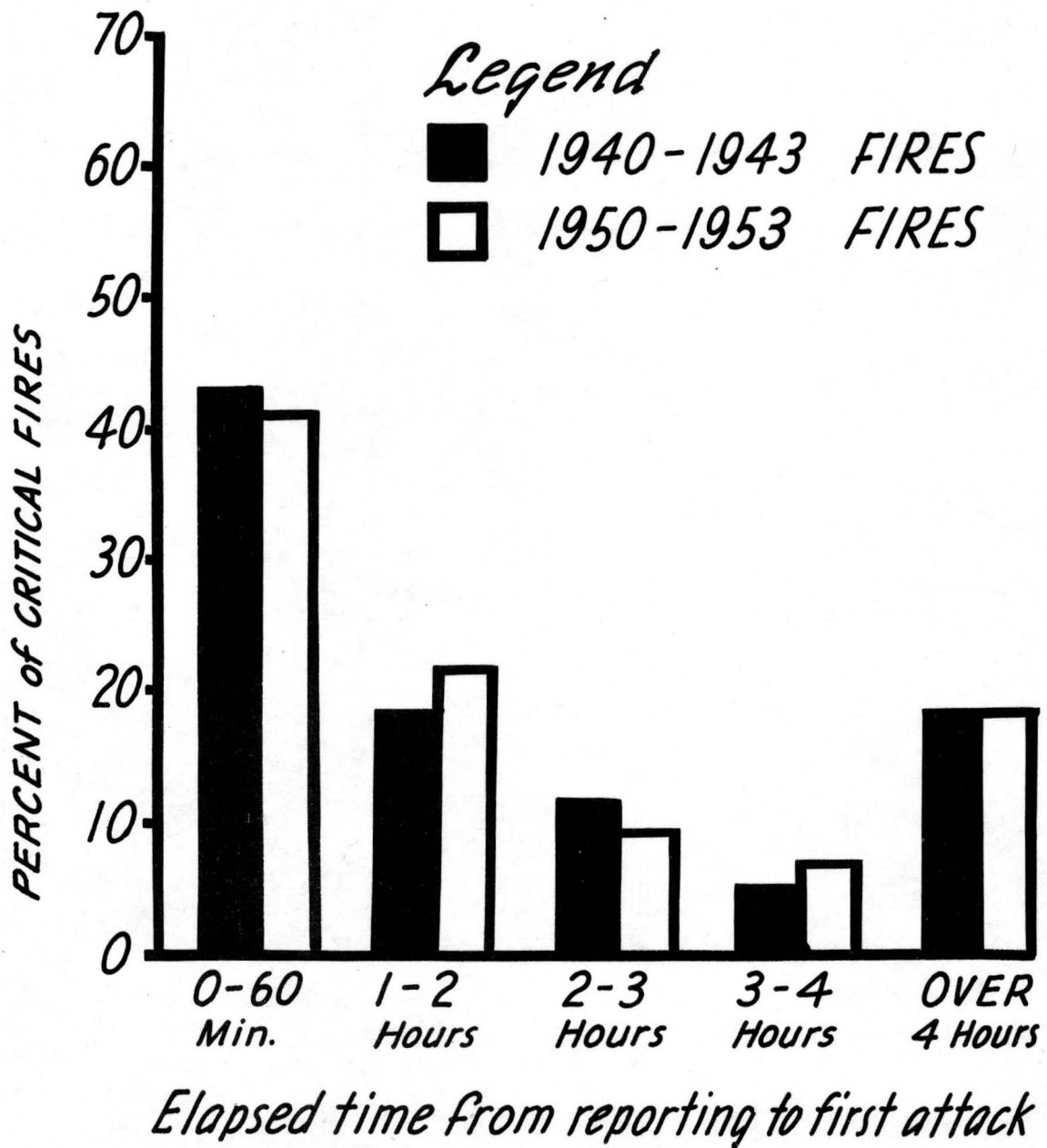


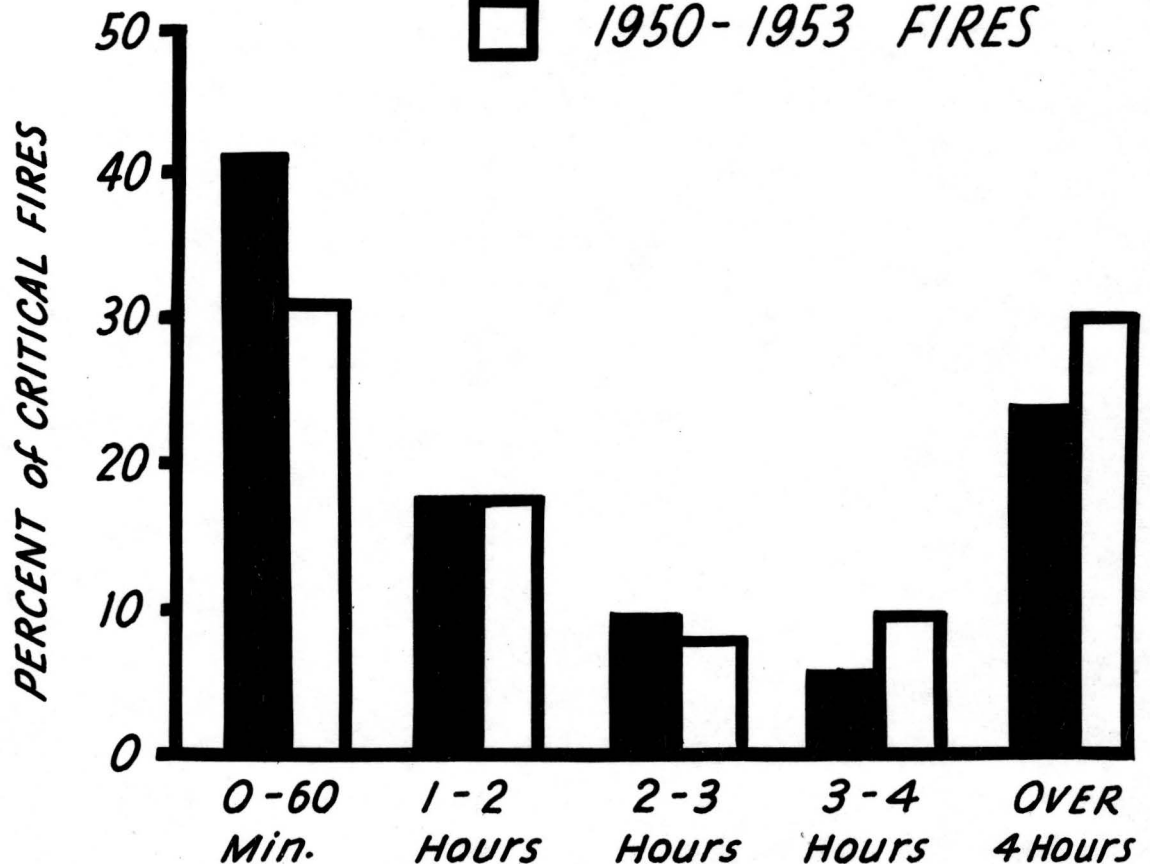
figure 7

***PERCENT OF CRITICAL FIRES BY
ELAPSED TIME FROM INITIAL ATTACK TO
ARRIVAL OF FIRST REINFORCEMENTS***

KANIKSU & LOLO Forests

Legend

■ 1940-1943 FIRES
□ 1950-1953 FIRES



*Elapsed time - Initial attack to
arrival of first reinforcements*

figure 8

***CUMULATIVE PERCENT OF CRITICAL FIRES
BY NUMBER OF MEN MAKING FIRST ATTACK***

KANIKSU & LOLO Forests

Legend

----- 1940-1943 FIRES
———— 1950-1953 FIRES

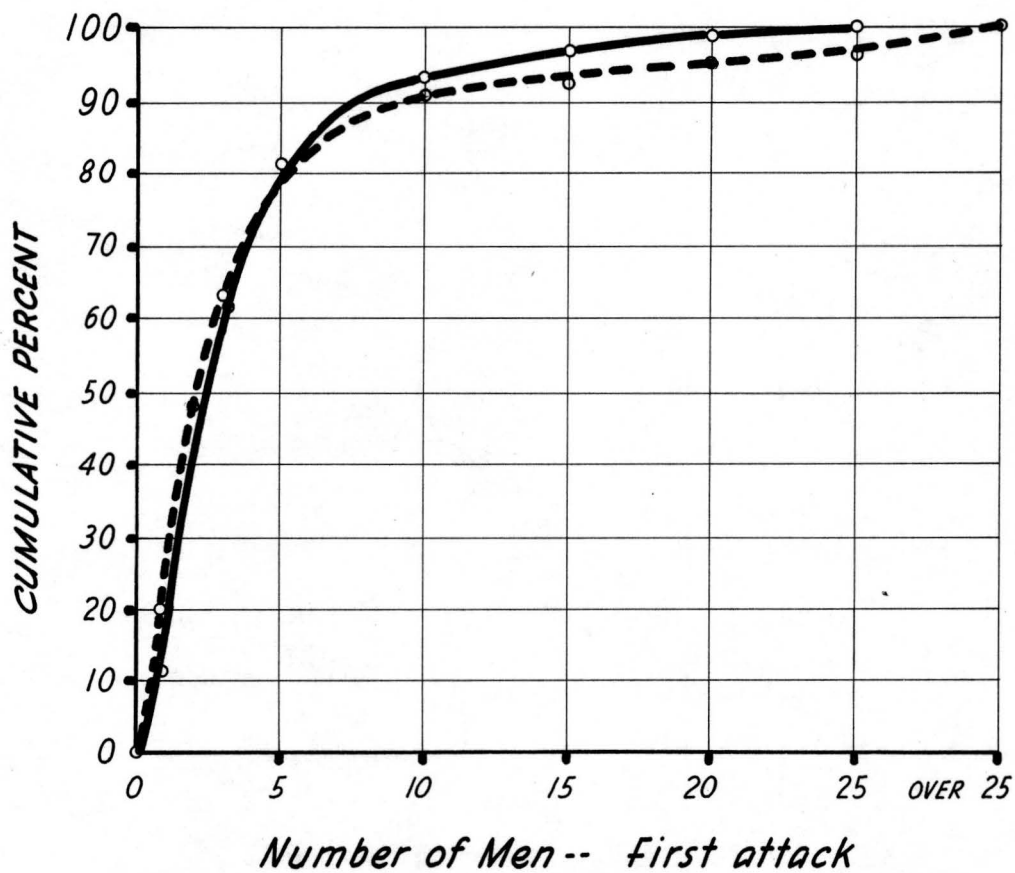


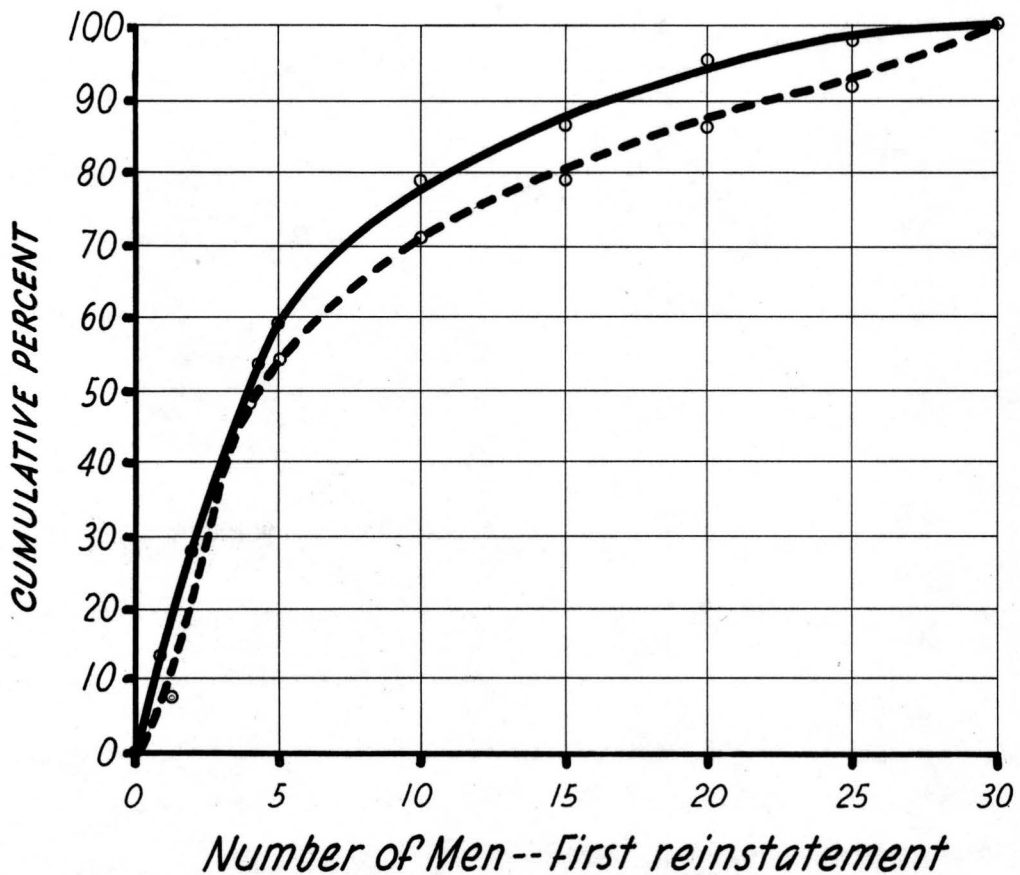
Figure 9

**CUMULATIVE PERCENT OF CRITICAL FIRES
BY NUMBER OF MEN IN FIRST REINFORCEMENTS**

KANIKSU & LOLO Forests

Legend

----- 1940-1943 FIRES
———— 1950-1953 FIRES



EFFECTIVENESS OF SUPPRESSION ACTION

THE PROJECT FIRE PHASE

By

Clarence K. Collins
Fire Control Officer, R-3

Presented at

FIRE CONTROL CONFERENCE
Ogden, Utah, February 1954

Topic I-C-2

EFFECTIVENESS OF SUPPRESSION ACTION

THE PROJECT FIRE PHASE

In approaching this subject, it became necessary to have a clear understanding of the term "Project Fire." The question was put to men with fire experience in four of the western regions with the result that we wrote to the Washington Office for the answer.

Consequently, project fires are those that have escaped initial action forces and that usually require mobilization of forces beyond what are available to the district in which the fire is burning.

Project fires probably make up 1% or less of the total number that occur each year. Thus we have two distinct situations for consideration. They are:

1. The small fire problem taking in the bulk of the fires as far as total numbers are concerned.
2. The large fire problem which calls for specialist type action on a greatly enlarged basis.

Each, in a sense, becomes separate fields of endeavor because of the vast difference in problems. This latter one concerns the project fire phase.

Effective initial action on small fires prevents a great number of project fires. Due to many factors such as wind, terrain, location, etc., we can always expect some project fires. They are the ones noticed by the public, and the ones that eat up the fire funds and do the most damage to the resource. Some seem to be handled better than others. Thus we can discuss some of the things that we are trying to do to better the situation and the problems facing those who have project fires.

The assignment included suggested points to be considered. They are:

1. What modern devices are being used now that were not used prior to 1950?

Regions 1 and 2 report trenchers. Region 3 is using R-8 type Talledega plows, trenchers, power saws, sawettes, paper sleeping bags, and disposable mess equipment. Regions 4, 6, 8 and 9 report none. Region 5 reports flame thrower trailers, 4-gal. backpack pumps, Edwards electric tool grinder, paper sleeping bags, disposable mess outfits, other backfiring equipment such as gopher gassers, Very pistol and Fenner grenade. Region 7 mentions F.M. radio.

2. Has there been any substantial increase in modern devices since 1950?

There has been a definite increase in use of modern devices by regions.
Items and regions mentioning them are as follows:

Item	Region								
	1	2	3	4	5	6	7	8	9
Bulldozers	X	X	X						
Radio	X	X	X				X	X	
Airplanes	X		X	X	X				
Helicopters	X			X	X				
Power Chain Saw	X		X	X	X	X			
Disposable Mess Equipment	X		X		X				
Paper Sleeping Bags	X		X		X				
Tank Trucks	X	X			X	X			
Harodike Canvas Tanks					X	X			
Pumper-Tanker		X	X	X	X				
Smokejumper Units	X		X	X					
Trenchers			X	X					
Sawette-Scythe			X	X				X	
Tractor Plows			X						
Tractor Pulled Tankers					X				
Hard Hats					X				
Pumps						X			

Not considered substantial or adequate by R-9.

3. Has your region intensified its "off the line" suppression effort?
(Example Business Management, etc.)

The regions report as follows:

Region 1 - Intensified its off-the-line suppression effort to some extent.

Region 2 - Made considerable headway in business administration. Examples are detailing clerks and timekeepers to all project fires and deputy fiscal agents have been on the ground for

paying firefighters when released. Have advanced in keeping voucherizing and payrolling current resulting in completion of office work at end of fire.

The Denver fire cache is cargoed for air drop and can be dispatched in 100 man units in a matter of minutes.

Region 3 - Worked out complete Business Management Guide and placed it in effect. This resulted in smoother action and more efficiency where the trained personnel were in charge.

Have also worked out better system for working with the Weather Bureau and in using their information.

Have also given considerable study to fundamental faults which require special training activities.

Region 4 - "In common with the other regions, we are earnestly trying to intensify practical 'off the line' suppression effort. Some of the things we are doing are:

- a. Requiring 'on the spot' reviews of the major fires immediately after they are suppressed.
- b. Making wider use of fire weather information, particularly spot forecasting on project fires.
- c. Improving service of supply procedure by using disposable camps out on the fire line to reduce travel time of firemen back to base camps.
- d. Serving of clean substantial hot meals prepared at central kitchens and delivery either by air cargo or by pickup to avoid setting up expensive and wasteful fire camps.
- e. Getting better scouting of fires so there are closer estimates made of needs.
- f. Paying more attention to the factors of fire behavior and making more intelligent estimates of manpower and equipment needs.
- g. Requiring better screening of fire fighters. We have just about gotten away from the former practice of recruiting fighters from centers of population. We rely on labor camps and other organized crews.
- h. Wider and more intensive use of VHF radios is made to handle communication on the fire. As a safeguard, duplicate sets are frequently provided.

- i. Consideration of the cost and effectiveness factor of tractors and other heavy equipment for this particular problem is given before ordering such heavy equipment.
- j. When fires burn on S&P lands, as well as NF lands, we are trying very hard and have been quite successful in getting the suppression costs shared equitably between land owners or administrators.
- k. FF expenditures as shown on Forms 929 are carefully scrutinized and many follow-up requests made for further information when costs seem out of line.
- l. Continually increased emphasis is given to safety, the use of hard hats, the use and deployment of forest safety officers, and the stressing of safety in all training schools.
- m. Closely related to (l) above is the supplying of pure drinking water to fire fighters even though it may require dropping containers from planes.

Region 5 - Intensified business management phases. Most forests also have been stressing behind-the-lines jobs at spring guard schools.

Region 6 - No particular intensification in recent years.

Region 7 - "The region has expended its cooperative fire forces in the wake of the unusual fire seasons experienced the fall of 1952 and 1953. This expansion had its inception at the beginning of World War II, at which time high schools and colleges were organized for fire suppression. The region has the advantage of a warden system which was organized in 1914 when local community leaders were made head of local organized fire crews. First action on a fire is almost always a warden crew. The region has the advantage of a local rural population with many high schools and colleges located within easy reach of the areas to be protected. This gives the region a big advantage in the vexing manpower problem."

Region 8 - Continuation of trying to improve "off the line" suppression operations by giving training and experience to available men, but cannot characterize that action as more intensive.

Region 9 - "We have emphasized and intensified preparedness for handling large project fires effectively and efficiently. This includes effort to improve both on-the-line and behind-the-line organization and performance."

4. Amount of overhead sent other regions in 1953. Show region and number of men. Indicate if this is an item that is increasing or decreasing and the problems of such assignment.

The regions' report as follows:

Region 1 - "Smokejumpers with their overhead were the only ones detailed out of the Region during 1953 due to our own severe fire season and heavy insect control work. However, the trend is upward. We sent quite a number in 1952 and 1951, and will again when we can."

Region 2 - "No overhead sent out in 1953. This is not an increasing item with us."

Region 3 - Overhead sent other regions: (Not complete due to dispatching of overhead and Indians at this time).

R-1	4
R-2	8
R-5	53

This is increasing and in relation to the number of Indian crews sent out of the Region. Seventy crews were dispatched to other western regions and agencies in 1953.

This places a burden on the sending region. It causes considerable interruption of other resource jobs. It does offer training opportunities. The under financing all along the line causes most of the difficulty.

Region 4 - Overhead sent other regions:

R-2	18
R-5	<u>44</u>
Total	62

"It is difficult to say whether this item is increasing or decreasing since so much depends upon occurrence and concentrations of fires. This is heavier than 1952 but lighter than 1950. We have been willing to help out just as far as we could when any calls come in because we know we can call on neighboring regions for help whenever we need it.

Some of the problems of such assignments are:

1. In order to spread the burden as far as possible so no one forest depletes its forces any more than necessary, recruitment is generally from a number of forests. For example, the last call received for 23 men in 1953 required drawing men from six forests. ..

This is better than we usually can do because it was late in the season. This procedure of course increases the dispatching time considerably, but more important than that is the increased cost for transportation because we either have to hire a number of small planes or else move the men to some central location to take advantage of bigger planes.

2. Since requests are generally for the more experienced men, it requires that we draw heavily on rangers, assistant rangers, general district assistants, and key foremen. The main problem that results from such practice is that it is often necessary to use people with other high priority resource management jobs.
3. The cost to the receiving region is always high because of transportation costs, communication costs, overtime, etc., and the short length of the detail. This is an important factor and should be considered when calls are made to be certain that the benefits derived are proportionate to the costs.
4. Offsetting the three disadvantages listed above is the fine training opportunities such details offer to our personnel. It has helped us materially to develop competence among our younger men and puts us in a much better position when our major fires require drawing men in from other forests.

We would not want this practice discontinued even though in some cases we might be unable to help out."

Region 5 - "Overhead and assistance furnished other regions in 1953. On June 1, sent 2 Forest Service airplanes, 2 pilots, and 1 cargo foreman to Region 3 fires. Also sent 400 cargo chutes. On April 18 had an alert from Region 3 for 21 line overhead, but cancelled due to improvement in fire condition. On June 4 had order for 25 line overhead, order cancelled while men were enroute, turned back before leaving Los Angeles.

The activity has increased during past 4 years. Plans should be to call upon adjacent regions to help on critical fire situations. This makes for better all-around control of such situations. Need for assistance should be detected early enough so there is no delay in getting to where needed.

Air transportation has cut travel time to where it takes only a few hours to take men from one region to another."

Region 6 - "Region Six dispatched 87 men to Region Five in 1953 as overhead. A total of 396 man-days were thus spent. Some of the

men worked on more than one fire, that is, they went from one fire or fires to fires on more than one forest.

July 8	25 men to Angeles Forest
July 15	24 men to the Los Padres Forest
August 13	20 men to Northern California
September 14	12 men to Northern California
September 21	6 men to Northern California

Help furnished Region 5 seems to be on the increase.

There is, of course, the problem of arranging transportation (usually by air) for these men. This problem, generally, is the Regional Dispatcher's, with whatever arranging is necessary on the forest.

The greatest problem in connection with these assignments is on the forest where planned work necessarily must take a holiday."

Region 7 - "The region sent no overhead out of the region in 1953. This has not been a problem in this region."

Region 8 - "R-8 has neither sent overhead to other regions, or received any outside overhead during the past 10 years. We did contribute a group of eight top overhead to the Bar Harbor Fire in Maine."

Region 9 - "No overhead was sent to other regions in 1953. Only once in recent years (in 1949) has this region sent overhead to another region."

5. Does your Region give any special consideration to the resource manager in relation to project fires?

The regions in general follow the system of including the resource manager as part of the fire team. In some special cases the resource manager is excused from general fire control work.

6. What do you consider the major problems or weaknesses in handling project fires?

Region 1 - "a. Keeping administrative officers alive to the need for a 'light' effective fire organization during successive seasons of relatively low fire danger and despite the pressure of expanding resource management jobs.

- b. Develop better mobilization plans to prevent unnecessary delays and wasteful use of manpower.

- c. More effective training of rangers and others who may have to make the decisions, in the calculation of probabilities. This means better knowledge of fuels, flammability, weather factors, and what to expect in the way of fireline production by both hand-tool and mechanical means.
- d. More research and administrative studies, regarding methods and techniques so that we can learn more about the best systems under different conditions.
- e. Lack of sufficient funds to enable us to hold a strong, well-trained force of key overhead to take care of the heavy peak-season loads in critical or near-critical situations."

Region 2 - "Our greatest weakness is of course manpower. Because of shifts in rural population, mechanization of farm and ranch activities, we no longer have the manpower pool we once had. Neither are men available around towns and cities. The result is we have to call on the military and the Indian crews. Pack stock is no longer available for packing which necessitates the development of air drop procedure.

The matter of uniform pay for organized crews is a problem that should be resolved before the 1954 season.

Uniform procedure for reimbursement of travel time between regions should also be given consideration.

Revision of safety code requirements for parachutes in light planes is desirable."

Region 3 - "We have several key problems in R-3. They are:

1. Lack of funds to finance the fire organization in relation to the fire load. Also to finance adequate training.

Other regions with a more adequate financial structure complain of the same thing. FFF can be resorted to to fill many needs, but on the emergency basis FFF cannot be used to do a planned job of regional and forest training in order that other P&M and FFF funds might be efficiently used.

2. The training job is lacking to develop project fire overhead in an orderly way. Better training could result in less project fires. It could also decrease the size of many project fires.

If we could train more of the individuals who have to fight the fires in the things already known, we could do a much better job than we are now doing.

Region 4 - A. "Our major problem is probably the increasing difficulty of securing trained and organized fire fighters. We have been fortunate to have Mexican Nationals, Farm Labor Camps, and Region 3 Indians to draw upon as a source of manpower following the CCC program. As long as farm labor camps continue in the farming areas of Idaho and Oregon, we can usually secure men until the end of August. After that date harvesting demands prevent our using them. These camps are a source of manpower supply over which we have no control over the type of men recruited, but the caliber of the men is much higher than of those we would secure by recruitment from large cities.

- B. The cost and time involved in quickly securing overhead for major fires is a recurring problem. Considerable progress has been made by advance planning and use of air transportation. The Boise, Payette, and Salmon National Forests can generally recruit the first nucleus of an organization from their own ranks. This is not true for the other 16 forests in the region who must depend upon detailers to overhead suppression forces on major fires. A few years ago we requested consideration by the Washington Office for financing of a well trained organized crew of from 25 to 50 men who could be worked on projects during the early season and then used as a flying squad for suppression action either as a crew or as overhead during the fire season. The study made at that time indicated that there was considerable justification, based on fire occurrence, for such a crew in the Boise area.
- C. The intelligence function needs further emphasis. The failure to procure the fullest intelligence of what a fire might do or of correctly evaluating and analyzing the information available often is primary reason for fires becoming extra period and costly. Poor reconnaissance and lack of knowledge of what a fire is doing is a severe handicap to the fire boss who must make the ultimate decisions. More and better research is needed.
- D. The service of supply function, particularly on the units where occurrence of project fires is sporadic, is a problem. We must strengthen our planning on this phase to avoid delays in attack, inaccurate timekeeping and over-working of the kitchen forces, etc. This problem has been overcome in part by feeding hot meals out on the fire line and by not setting up big fire camps. We still can make improvements in getting a day shift fed and out of camp before daylight.

- E. We do not yet have enough radio equipment and trained technicians to furnish adequate communications to all project fires during the initial stages. We plan to overcome this problem as rapidly as finances permit.
- F. We need to give further training on proper line-location and methods of attack in the use of bulldozers and other equipment. We still find too many cases of costly line construction that is not properly located or burned out.
- G. We have made considerable progress in the orientation of green crews that are recruited. The Supervisor of the Payette Forest, for example, has set up a separate camp where these recruits are assembled, organized, and given training in the use of tools with emphasis on safety. This is a worthwhile project and one that we want to continue so that crews have an idea of what is to be accomplished and their part in the suppression job.
- H. We have a continuing problem, in the use of smokejumpers, of promptly retrieving the men and their equipment from back country fires. Any season in which we get concentrations of fires on forests using the jumpers, all of the men are soon out on fires. In order to get them back as soon as possible for initial attack on other fires, it is necessary to send ground crews immediately following the dispatch of the jumpers. This requires considerable movement of experienced small crews and of crew leaders who can find their way and be depended upon to see that the fires are put out."

Region 5 - "The major problem in handling project fires is in service function. A lot of the costly slips in controlling major fires are due to inadequate functioning of the service organization on the fire.

Our dispatching setup can get the men and materials to the fire area. This part of the job is tops—but unless the service organization on the fire can function at top level, things do not get to the right places on the fire at the right time."

Region 6 - "Scouting and fire-line inspection continue to be Region 6's major weakness handling project fires."

Region 7 - "The variability of the fire load from year to year requires planning to meet the bad year. The level of preparedness required for a bad year is in a sense lost effort if the bad year does not materialize. An easy year sets the stage for a let-down for preparedness action in the year when it

is required. There is a strong human factor which must be overcome to prevent a let-down. Rustiness from lack of actual experience is inevitable when two years of easy going occur together. The phase of fire control most affected is organization for the large fire because the erratic occurrence does not give the region's personnel sufficient opportunity to become proficient. Part of the difficulty possibly could be overcome by a regional training school. The present thought on that subject is that the region's fire dollar should be used for higher priority needs and the region cannot afford a regional fire school."

Region 8 - "R-8 men are not very well equipped to authoritatively discuss project fires, as we understand that term. We enjoy certain advantages of accessibility over most of this area; all but the rugged sections of the Appalachian mountain chain, and we go for as much as ten years without a project fire.

Rather than large and long drawn out individual fires, our characteristic problem is large number of simultaneous fires. They can get big in a hurry. Successful control here is predicated on early action in decisive strength backed up by fast follow-up.

We, of course, are often tempted to resort to the large overhead fire organization with direction assumed by "off district" men. However, under our conditions our strongest asset results from developing rangers to handle their situations and concentrating primarily on organizing, training, and equipping the nearest sources of resident manpower to where there will be strong attack at small fire stage, and the total available strength calculated to stop the fire by its intermediate stage should first attack fail.

Our distance from areas of project fire concentrations limits the value of our views. We do have in this Region men who have worked extensively both in project fire country and elsewhere. In retrospect, they recognize existence of situations where application of project fire organization is sometimes unavoidable and most effective. Also they point to a possible inherent weakness; that is, tendency to substitute and rely on the project approach, with its accompanying time lags and cannibalizing of overhead, when better prepared and more reliant local leadership still had a good chance to head off a fire from reaching project proportions.

We attribute the marked reduction in numbers of project fires in R-8 largely to (a) installation of effective mechanical fire line equipment which greatly increased the

speed and quality of fire line construction and (b) building the suppression organization around the regular line organization with integration and quick use of all local facilities."

- Region 9 - A. "Not having an adequate fire overhead organization, or not getting it set up and functioning soon enough. While some men in the large fire organization may not be too well qualified because of lack of experience and training, the chief fault has been in not filling the positions with the best qualified men soon enough. As a result a few men, and particularly the Fire Boss, become bogged down with details. Without adequate overhead many essential functions or phases of the fire job are neglected, such as calculation of all probabilities and planning sufficiently in advance.
- B. Another weakness is lack of knowledge of fire behavior and its relation to weather and fuels. This lack of knowledge or sensitivity to all the probabilities of the effects of weather and fuels often spells the difference between success or failure in controlling fires. It is all too often that the unanticipated or unexpected behavior of fires cause serious trouble. Better fire weather forecasts and more on-the-line experience, together with more basic knowledge on the subject seems to be the answer to this problem."

In summary we can probably agree on some of the problems and certain other aspects of the project fire phase. On others there may be disagreement. I found it hard to find the time to answer well all the requests for information by those on this program. I am sure others had the same problem. Consequently, time was lacking to think out the various phases as well as those requesting information might have liked. I have tried to take enough time to at least analyze the information sent me from the other regions and add to it some other thoughts with which this group may or may not agree. We in R-3 have had some chance to see how things are done in other western Regions in connection with the assignment of liaison officers with the Indian fire fighters sent out from this region. Over 80 Crews of Indians were sent out of R-3 this year. The problems and conditions which came about in connection with these assignments has caused us to take a very critical look at our own organization. As a result, I offer for consideration the following conclusions:

1. It appears that the regions are taking advantage of new and modern devices within the scope of available funds. They are also attempting to intensify off-the-line suppression efforts. They are answering the call for overhead from other regions as best they can.

2. Appropriations for the field of fire protection fall far short of what is needed. Present economy measures by Congress will probably leave us with the same financial problems for at least several years.
3. This philosophy of minimum financing leaves us with the problem of doing the best job possible with what we have. Minimum financing has resulted in "shotgunning" the funds through the entire field of fire protection. This approach is probably the only one that can be made under the circumstances. A second look should be taken of the financial pattern that comes as a result of this method. Shotgun users know that, while certain shells cost the same, that those with certain size shot make an even pattern than others. Guns of the same make and bore vary. Some pattern better, for example, with #4 shot than with #5, #6, or #8 shot. Thus sometimes a better pattern results from using a shell with fewer shot of a larger size. Sometimes the opposite situation is the result.

We need to make sure that we are getting the best financial pattern in fire protection. This is not only important from forest to forest but from Region to Region.

4. Under somewhat comparable financial situations we find a big problem of getting comparable results. Some get more for their dollar than others. This is, in part, a human factor that shows results with a careful program of selection, training and providing for experience.

We preach the use of the best man to take charge of a fire on any forest. This thinking is generally confined to the forest itself. In some cases there is considerable doubt as to who is the best man. How many times has this resulted in uncalled for expense and damage? Perhaps we need to spend more time in training and selecting qualified project fire men. We cannot afford to gamble with men of questionable ability to take charge of project fires. Perhaps we should consider project fires as those that should be handled by trained project fire teams of known ability. The average ranger would agree to a project fire team. At present there is a reluctance to relieve the ranger of the responsibility of handling project fires because of the hard feelings that may result from placing another person, often of equal rank, in charge of the fire.

There is no substitute for training and experience. Position does not automatically bestow on any individual ability or experience. If we could train the men who fight the fires in the basic things already known, we would get better results. Further research will not pay in full unless it can be integrated into a sound pattern of training.

5. Closely related to the other points is the need to standardize approaches, methods and procedures. As long as the Forest Service believes in transferring men from one Region to another, and believes in detailing fire overhead from one region to another, there is a need to standardize as much as possible. At present the regions cannot even agree on a standard time slip.

Fighting a forest fire has been likened to fighting a war. Wars are not won by armies of individual thinkers who take individual action. Standard methods with the training of well organized and equipped men who are guided by trained, selected, and experienced staff officers win the battles. The same applies right on down to minor skirmishes.

The present program in fire control of individual freedom is expensive and further complicates training and the establishing of fire organizations that have any teamwork. It further contributes to confusion.

Finally, this meeting, according to the circular, was called with hopes of working out methods of getting a better job done. If the present job is acceptable, there would be little need to have a meeting at a time when every cent of expenditure is being scrutinized. Let's hope that some action program results from this meeting.

EFFECTIVENESS OF SUPPRESSION ACTION

AVERAGE SIZE OF MC AND LIGHTNING FIRES
NUMBER OR PERCENT OF CLASS A AND B AND CLASS C, D AND E FIRES
NUMBER OR PERCENT OF EXTRA PERIOD FIRES

By

C. C. Buck, Chief,
Division of Fire Research
California Experiment Station

Presented at

FIRE CONTROL CONFERENCE
Ogden, Utah, February 1954

EFFECTIVENESS OF SUPPRESSION ACTION

AVERAGE SIZE OF MAN-CAUSED AND LIGHTNING FIRES,
NUMBER OR PERCENT OF CLASS A AND B AND CLASS C, D
AND E FIRES, NUMBER OR PERCENT OF EXTRA PERIOD FIRES

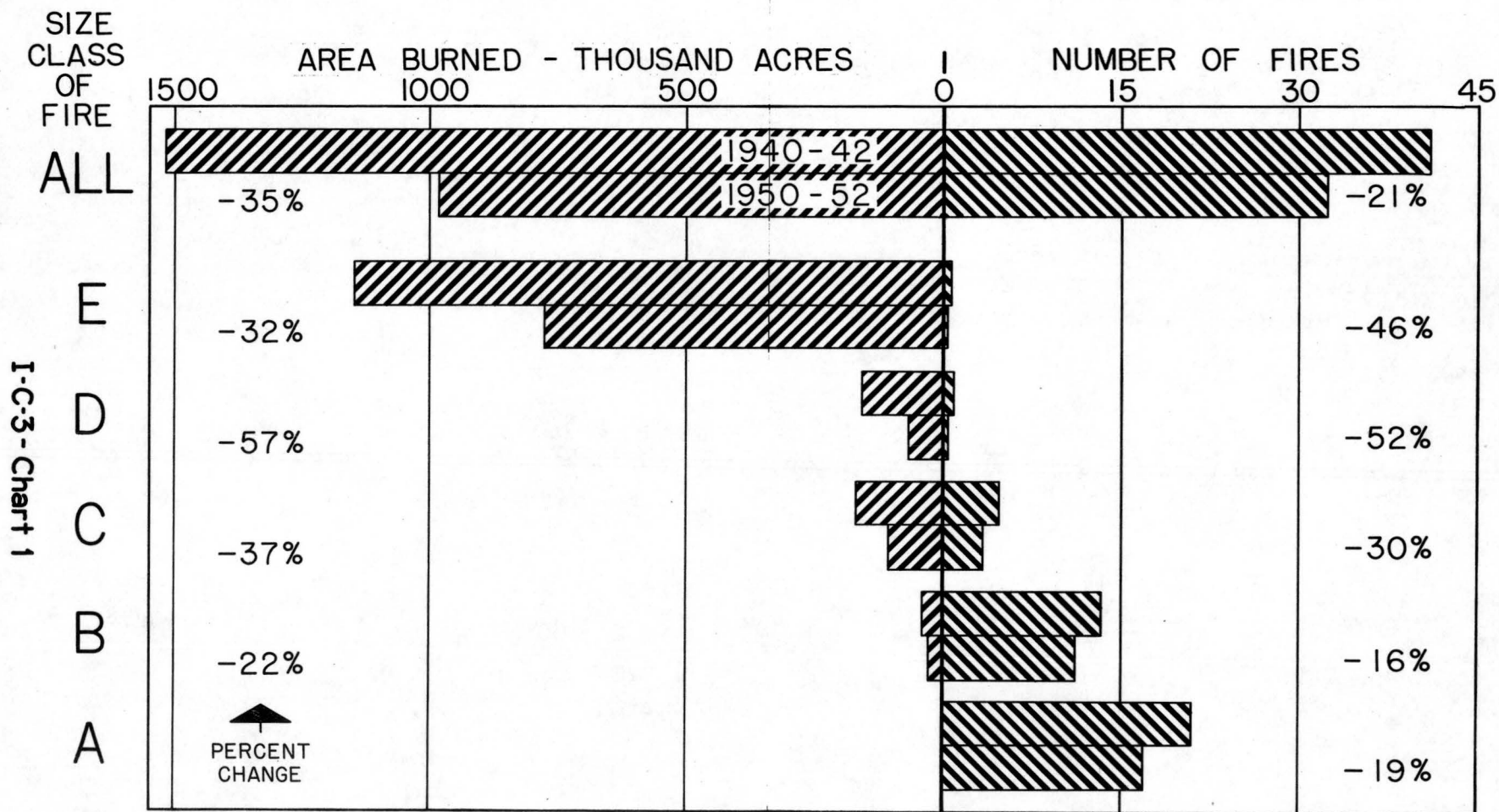
*all fire
reports
made*

Charts which follow present some comparisons in numbers, sizes and areas burned between the two periods, 1940-42 and 1950-52. The individual charts show that in various regions significant changes in some of the measures describing the fire business took place between the two periods. In other regions the same changes did not occur.

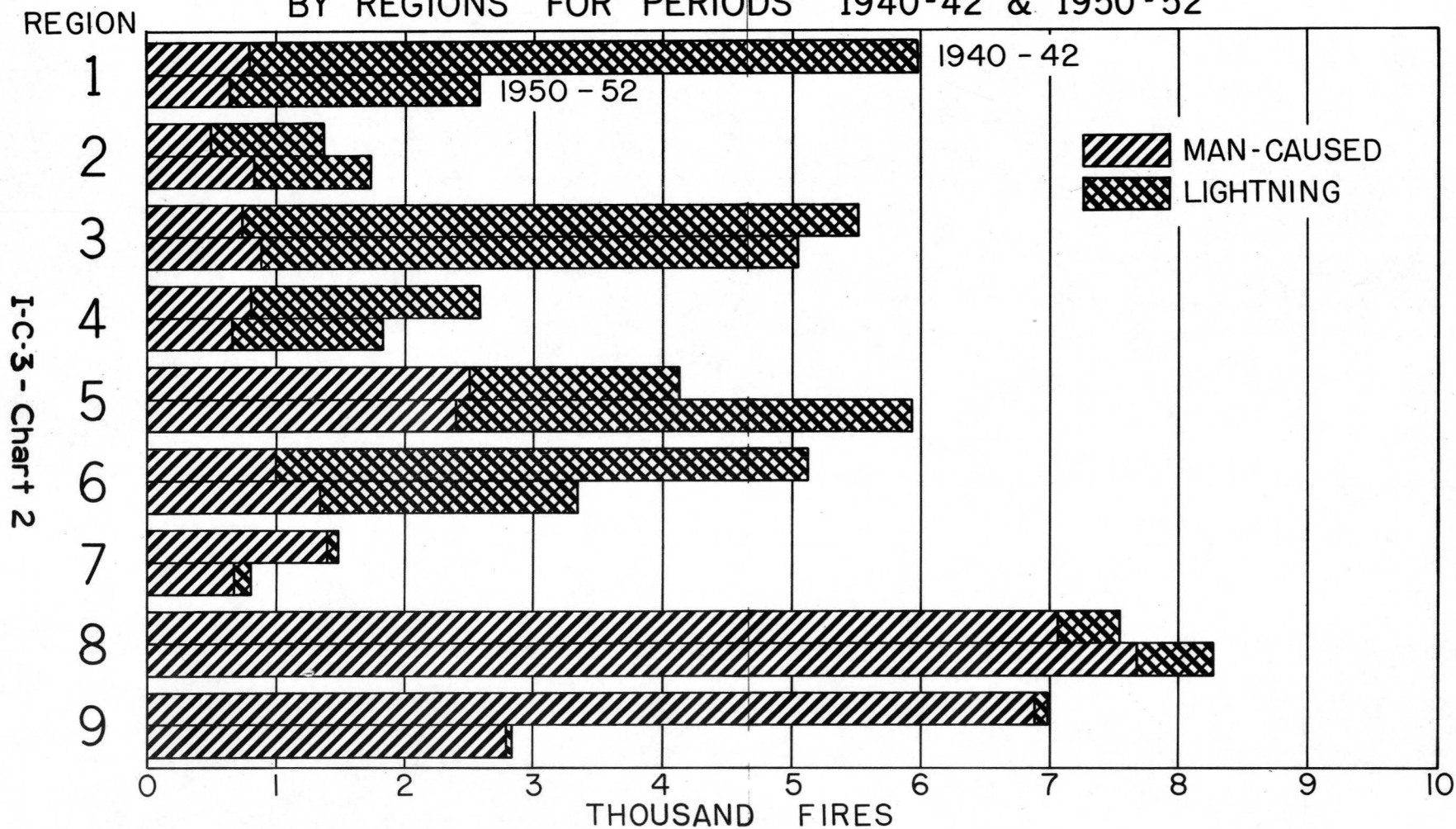
Data are not available from which differences in the average severity of burning conditions can be determined, either between regions in any given year or between periods for any one region. The data given thus describe the results of protection by periods and regions but give no clue as to what brought these results about.

- Chart 1. Number of Fires and Area Burned on National Forests by Size Classes for Periods 1940-42 and 1950-52.
- Chart 2. Number of Man-caused and Lightning Fires by Regions for Periods 1940-42 and 1950-52.
- Chart 3. Total Acres Burned by Man-caused and Lightning Fires by Regions for Periods 1940-42 and 1950-52.
- Chart 4. Average Sizes of Fires by Regions for Periods 1940-42 and 1950-52.
- Chart 5. Average Sizes of Class E Fires by Regions for Periods 1940-42 and 1950-52.
- Chart 6. Percent of Man-caused and Lightning C, D and E Fires by Regions for Periods 1940-42 and 1950-52.
- Chart 7. Number and Percent of Extra-period C, D and E Fires by Regions for Periods 1940-42 and 1950-52.

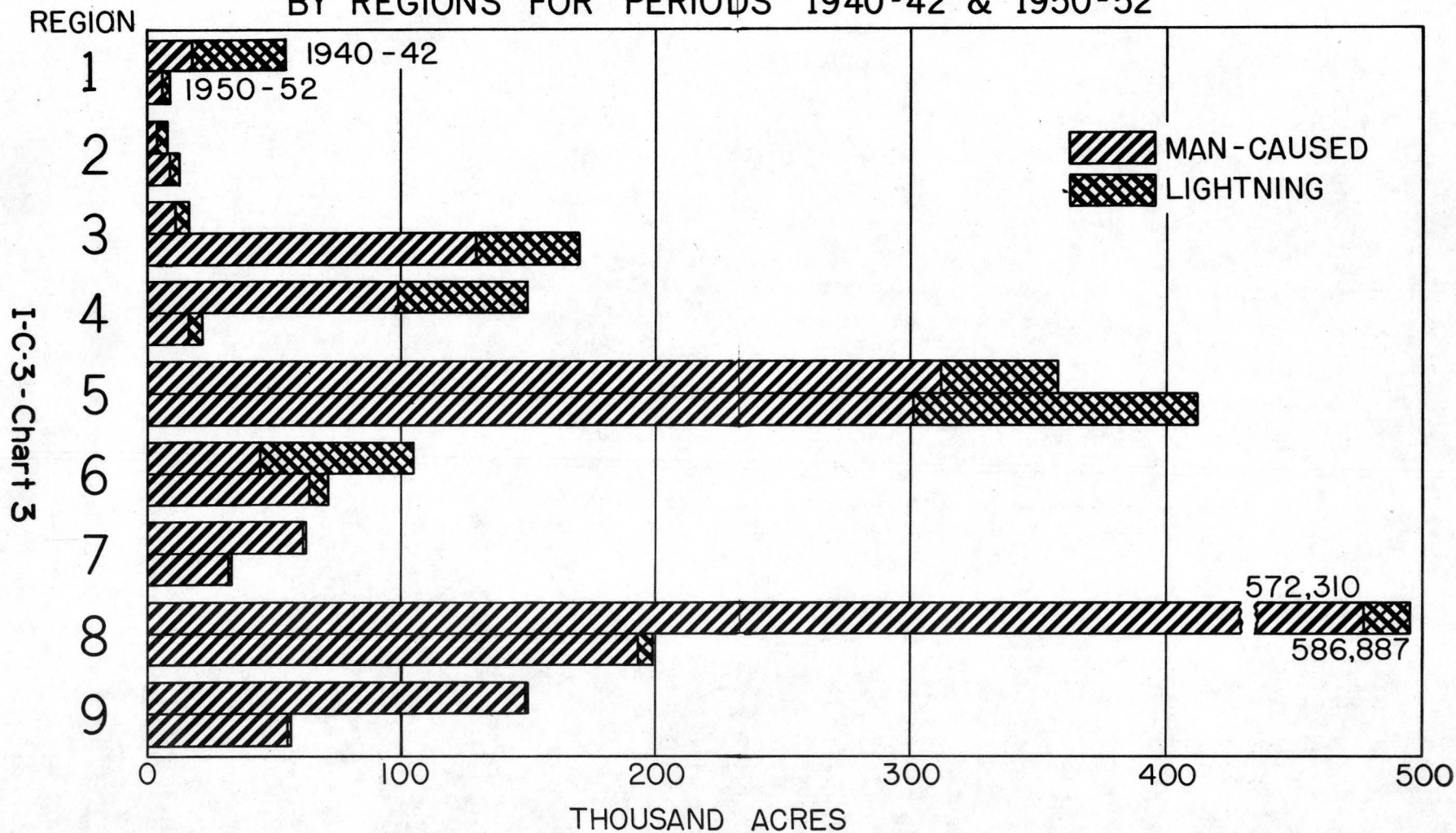
NUMBER OF FIRES AND AREA BURNED ON NATIONAL FORESTS BY SIZE CLASSES FOR PERIODS 1940-42 & 1950-52



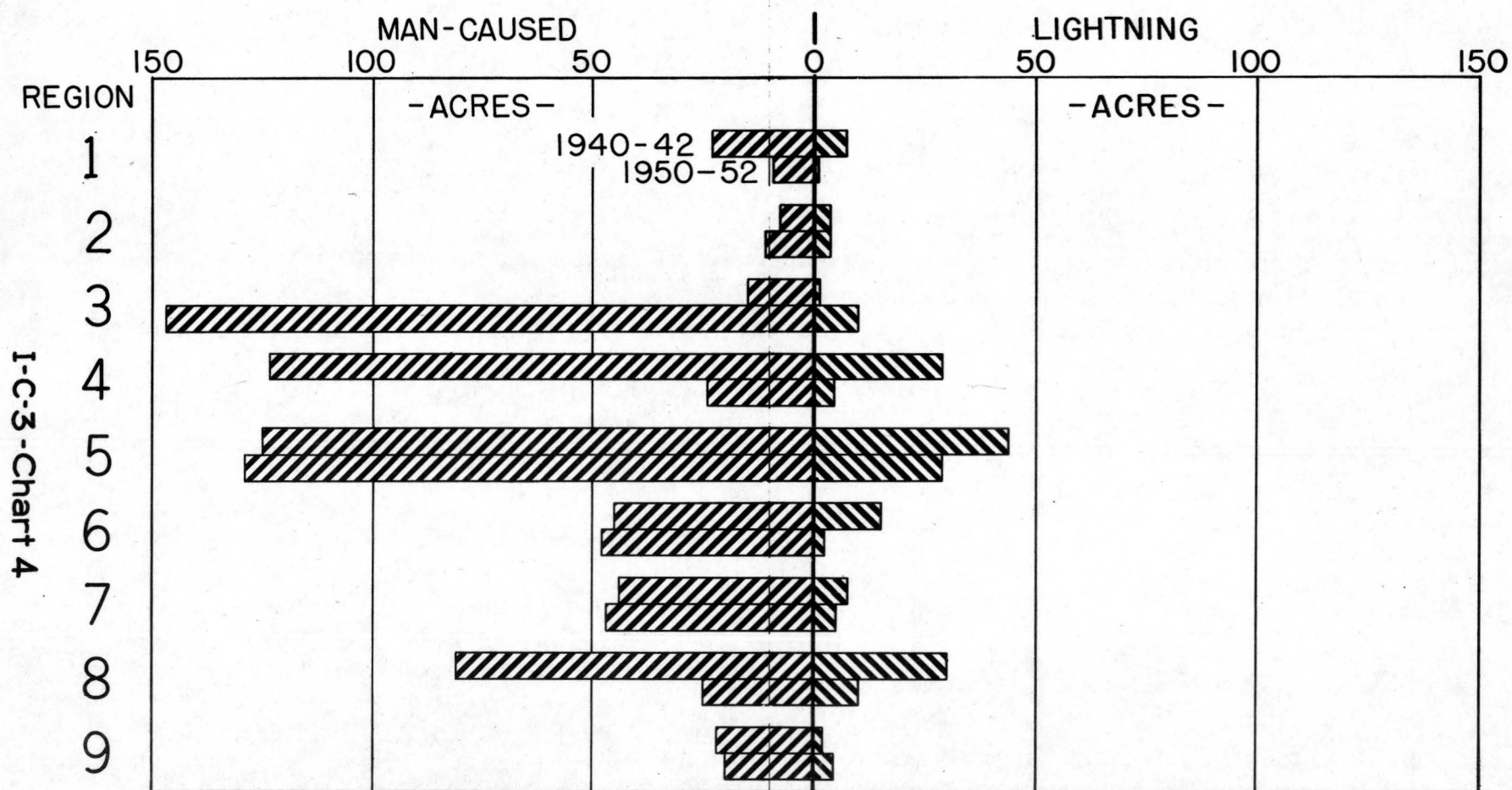
NUMBER OF MAN-CAUSED AND LIGHTNING FIRES BY REGIONS FOR PERIODS 1940-42 & 1950-52



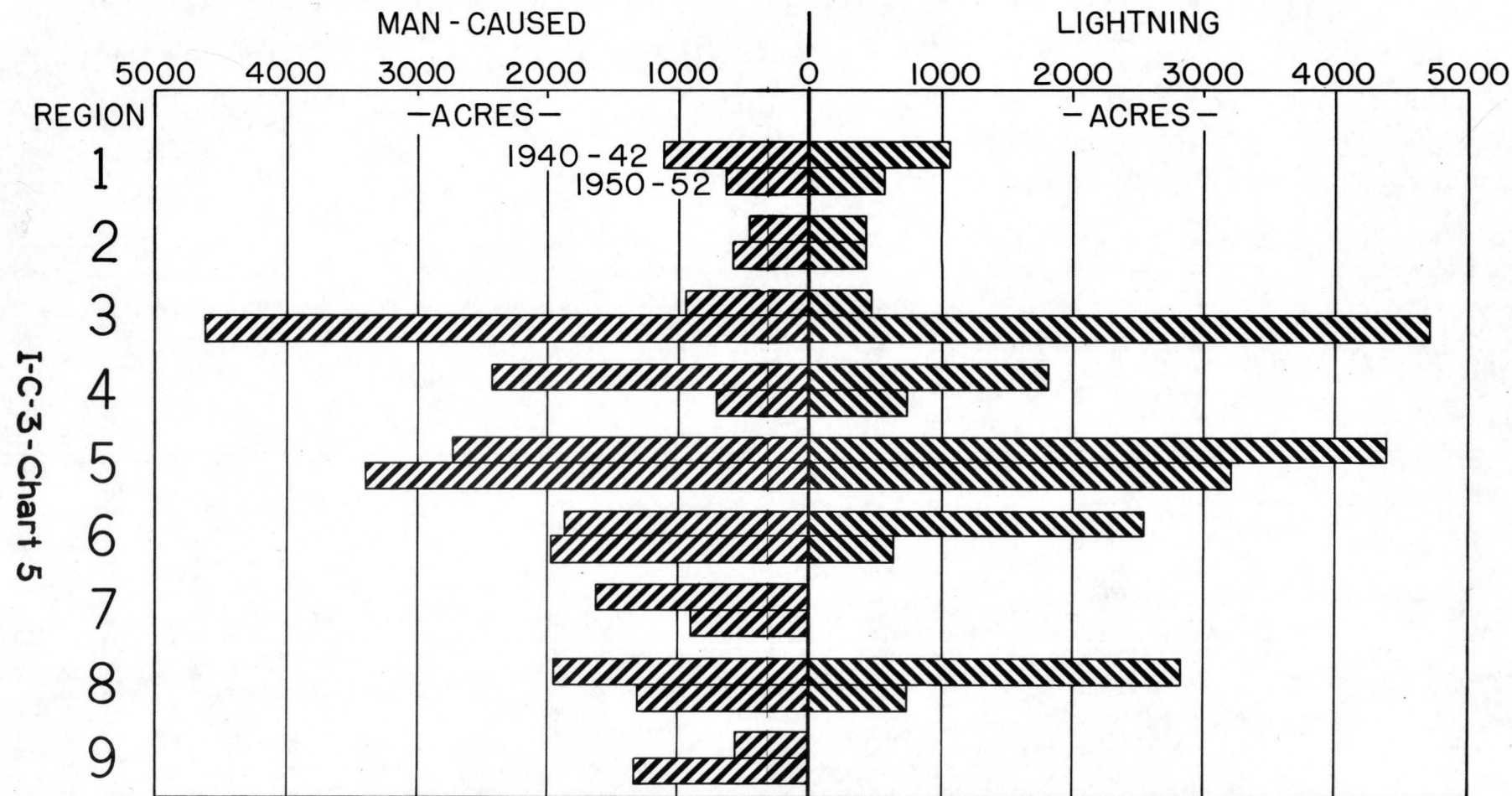
TOTAL ACRES BURNED BY MAN-CAUSED AND LIGHTNING FIRES BY REGIONS FOR PERIODS 1940-42 & 1950-52



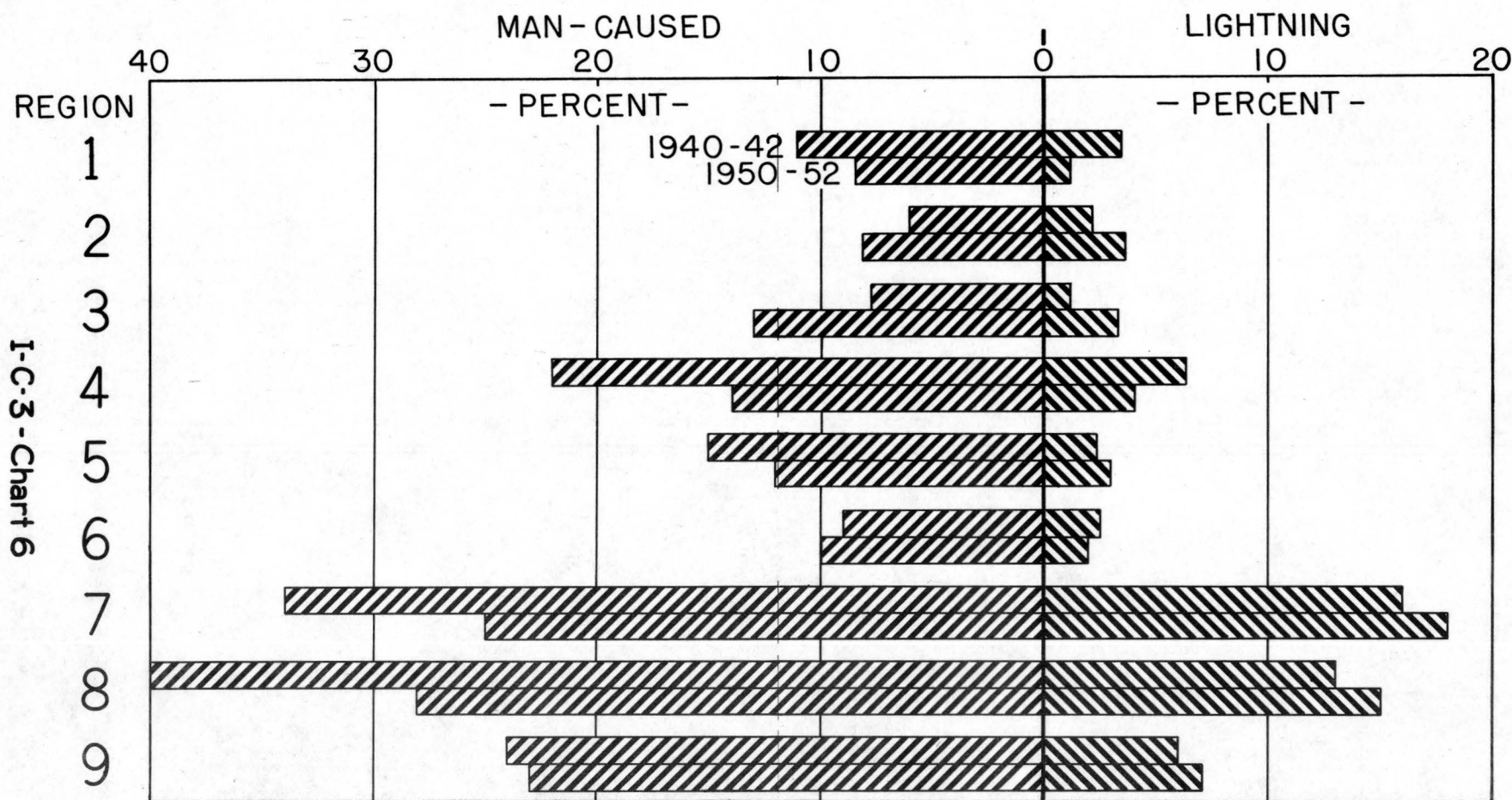
AVERAGE SIZES OF FIRES BY REGIONS FOR PERIODS 1940-42 & 1950-52



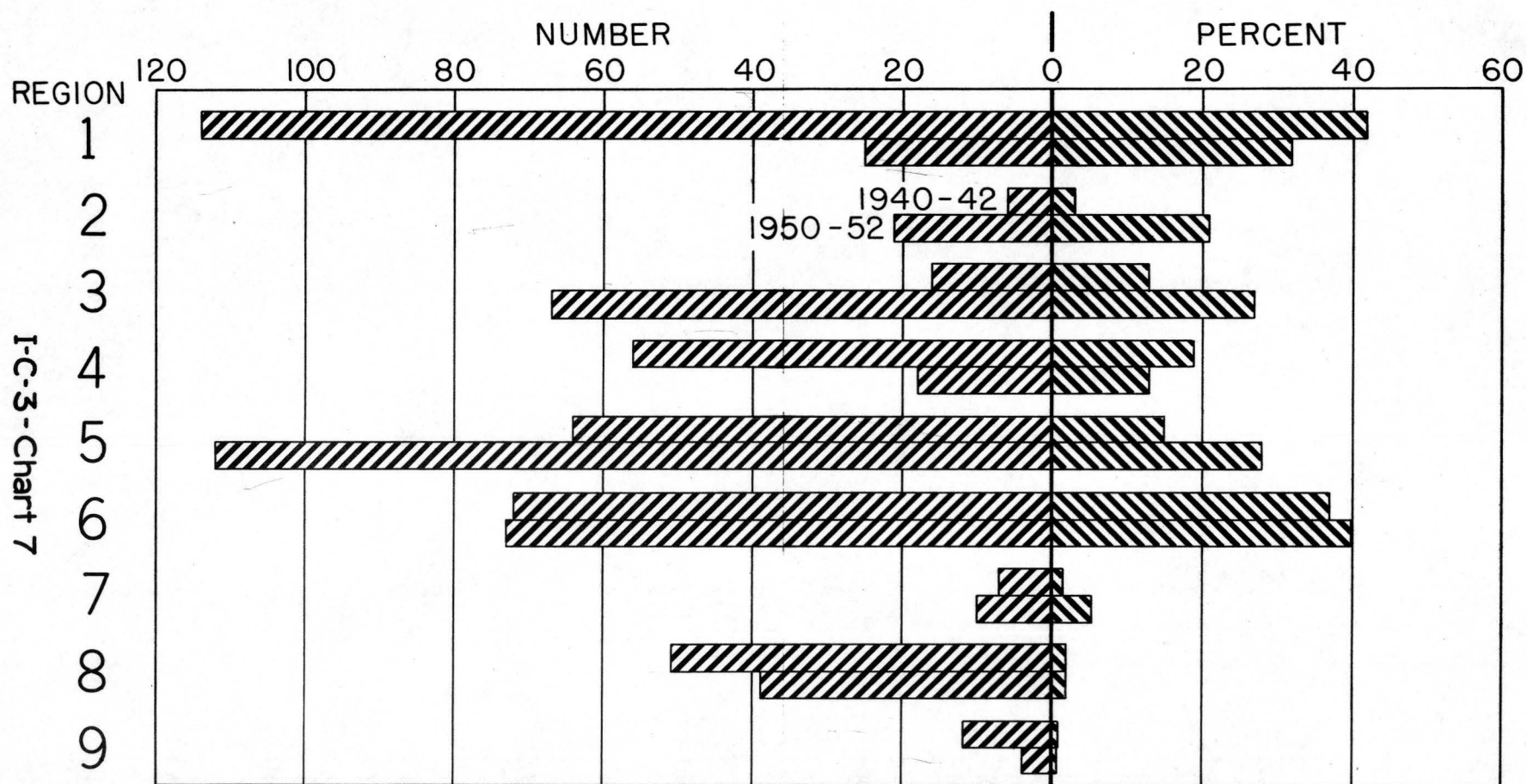
AVERAGE SIZES OF CLASS E FIRES BY REGIONS FOR PERIODS 1940-42 & 1950-52



PERCENT OF C, D, & E FIRES BY REGIONS FOR PERIODS 1940-42 & 1950-52



NUMBER AND PERCENT OF EXTRA PERIOD C, D, & E FIRES BY REGIONS FOR PERIODS 1940-42 & 1950-52

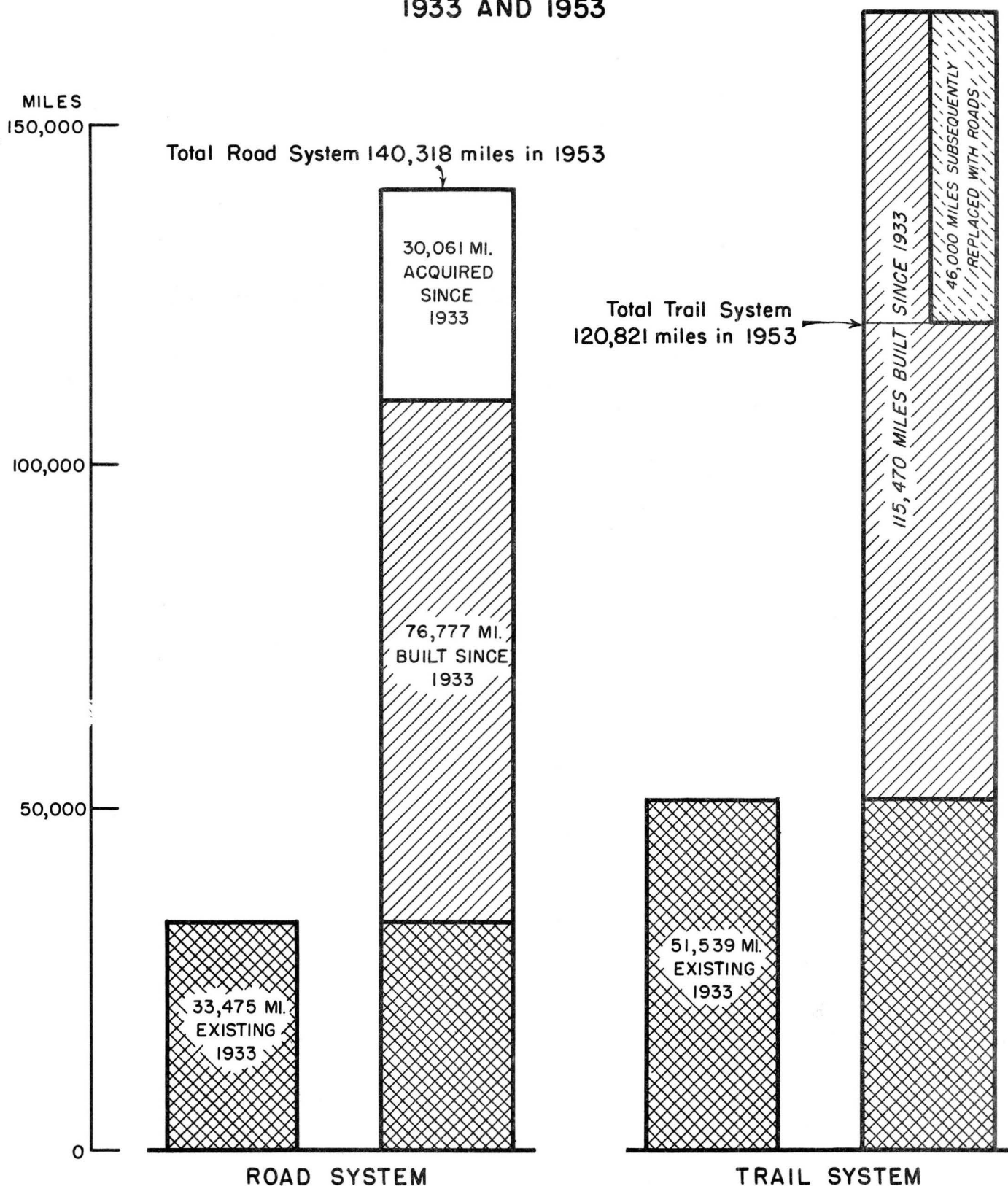


EXHIBITS RELATING TO INCREASED
ACCESSIBILITY ON NATIONAL FORESTS

- A. Chart showing ROAD AND TRAIL SYSTEM - 1933 and 1953.
- B. Chart showing GROWTH OF ROAD AND TRAIL SYSTEM - 1933 to 1953.
- C. Chart showing 1953 ROAD MILEAGE in PER CENT of 1933 MILEAGE for ROADS with FIRE PROTECTION VALUE: for All Regions; for Regions 1, 2, 3 and 5 separately, with 4-Region total; and for 2 Forests each in Regions 1 and 3 to 9, with 16-Forest Total.
- D. Chart showing same as B except for Combined Roads and Trails.
- E. Tabulation of INVENTORY CHANGES in FIRE CONTROL IMPROVEMENTS for All Regions and for Regions 1, 2, 3 and 5 with 4-Region Summary.
- F. Tabulation of INVENTORY CHANGES in FIRE CONTROL IMPROVEMENTS on 2 Forests in each Region (R1 to R9) and Summary for 16 Forests in Regions 1 and 3 to 9. (Data incomplete for Region 2 forests, hence these forests excluded from the summary.)
- G. Tabulation showing ADDITIONAL FIRE CONTROL IMPROVEMENTS REQUIRED as reported by Regions 1, 2, 3 and 5 and for 2 Forests in each of Regions 1 to 9.

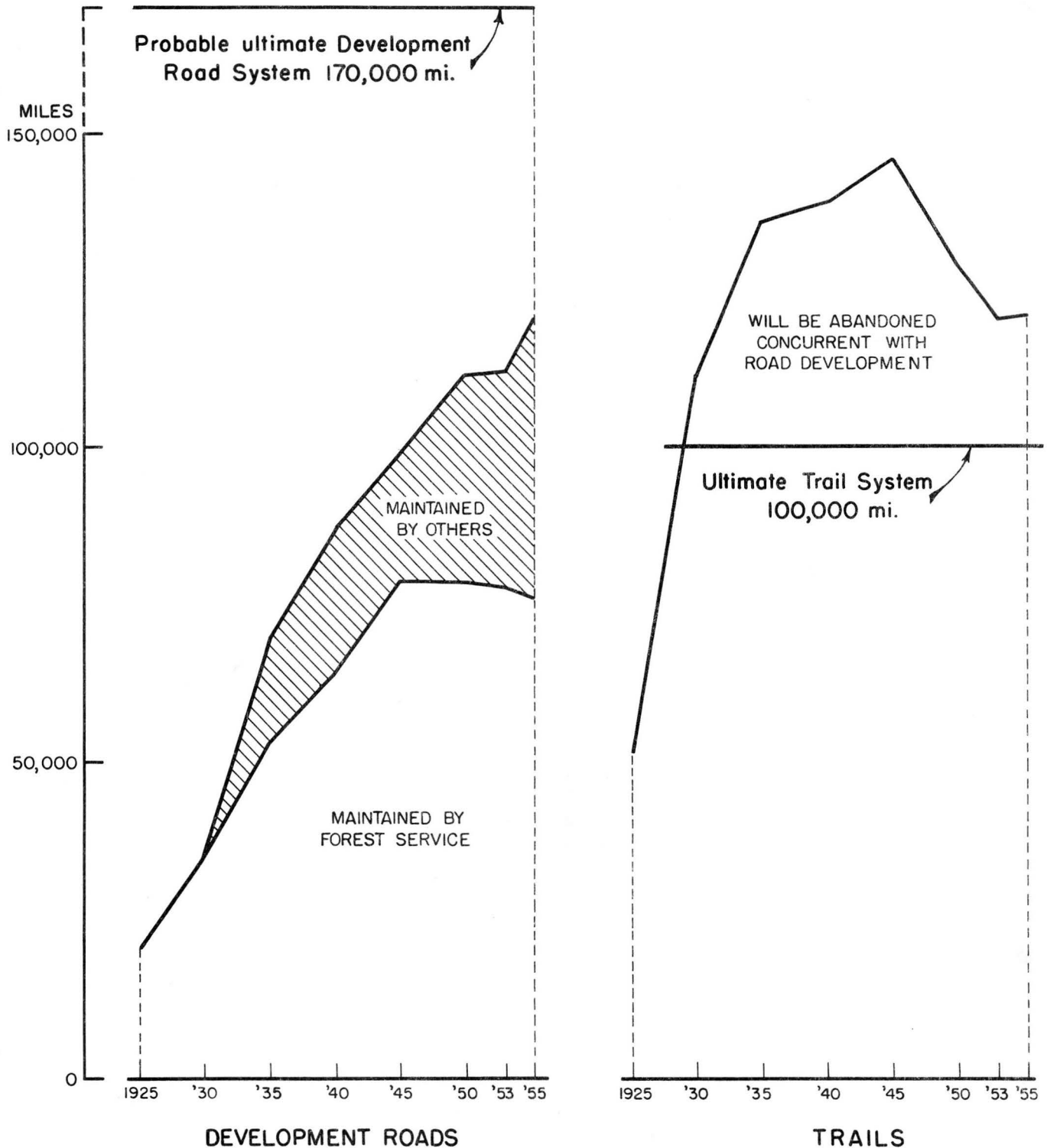
Note: Charts and tabulations deal with only that road mileage relating to Protection Roads.

IMPROVED ACCESSIBILITY ON NATIONAL FORESTS
ROAD AND TRAIL SYSTEMS
1933 AND 1953



ROAD INVENTORIES BY REGIONS ASSIGN PROTECTION VALUE TO 89% OF SYSTEM
TOTAL ROAD MILEAGE INCLUDES FOREST HIGHWAYS

NATIONAL FOREST DEVELOPMENT ROADS AND TRAILS GROWTH IN EXISTING MILEAGE 1925 TO 1955 (est.)



1953 ROAD MILEAGES IN PERCENT OF 1933 MILEAGES

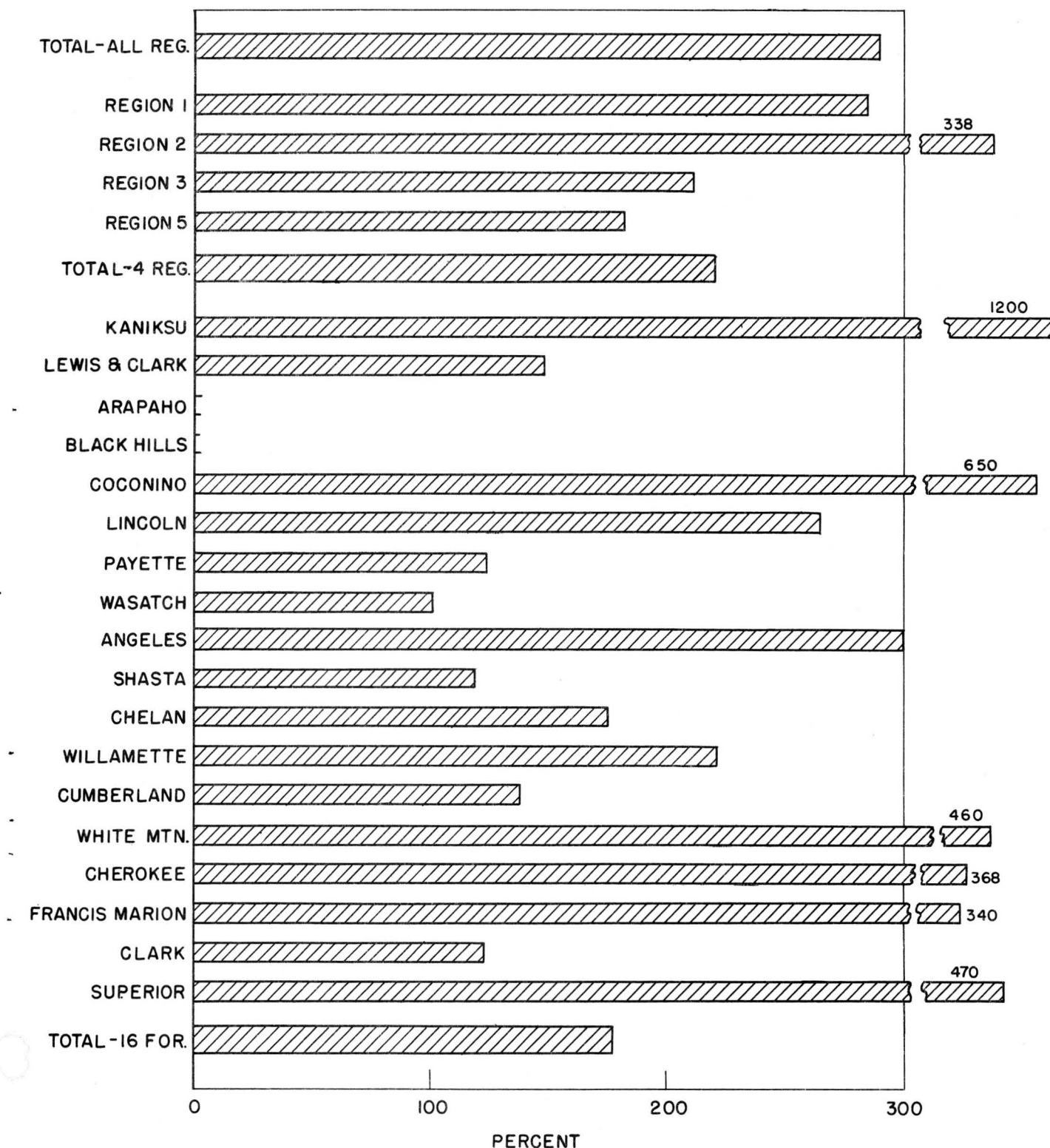
FOR ROADS WITH FIRE PROTECTION VALUE

FOR

ALL NATIONAL FORESTS COMBINED; REGIONS 1,2,3,& 5 SEPARATELY
AND 4 REGIONS COMBINED

AND

CERTAIN FORESTS IN REGION 1 AND IN REGIONS 3 TO 9



COMBINED ROAD AND TRAIL MILEAGE FOR 1953 IN PERCENT OF COMBINED MILEAGE FOR 1933

FOR
ALL NATIONAL FORESTS COMBINED; REGIONS 1,2,3 & 5 SEPARATELY
AND 4 REGIONS COMBINED

AND
CERTAIN FORESTS IN REGION 1 AND IN REGIONS 3 TO 9

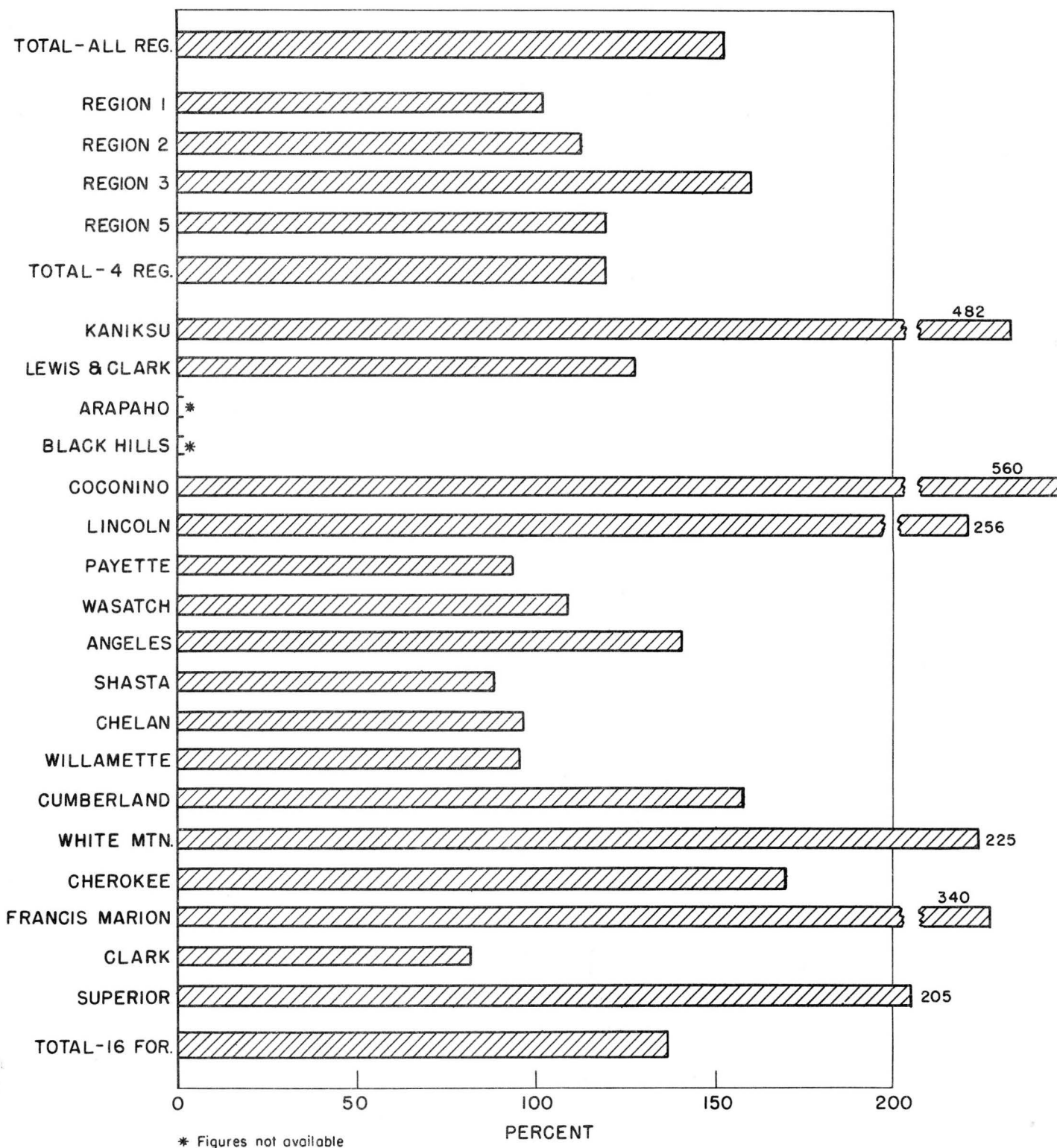


EXHIBIT E

INVENTORY CHANGES IN NATIONAL FOREST FIRE CONTROL IMPROVEMENTS 1933 TO 1953

FOR ALL NATIONAL FORESTS COMBINED, FOR REGIONS 1,2,3 AND 5 SEPARATELY, AND FOR 4 REGIONS COMBINED

ITEM	ALL NAT. FOR.		REGION 1		REGION 2		REGION 3		REGION 5		TOTALS (4 regions)	
	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953
ROADS MILES	49,147		4,147		2,366		7,277		13,411		27,201	
		125,000		11,765		8,020		15,379		24,525		59,689
TRAILS MILES	113,219		35,816		15,306		5,883		20,169		77,174	
		120,821		29,021		11,966		7,355		16,004		64,346
LANDING FIELDS NUMBER			2		0		0		8		10	
		112		24		0		18		16		58
TELEPHONE LINES MILES			14,300		2,786		3,354		7,000		27,440	
				10,227		1,080		4,015		4,300		19,622
RADIOS NUMBER			59		0		5		0		64	
		7,633		1,031		150		525		600		2,306
RADIO COVERAGE SQ. MI.			451		0		200		0		651	
				20,126		14,000		35,000		25,537		94,663
LOOKOUTS NUMBER			840		3		90		114		1,047	
		2,083		284		20		98		297		699
LOOKOUT DETECTION COVERAGE SQ. MI.			21,501		300		16,000		10,166		47,967	
				15,136		2,700		18,750		18,000		54,586
FIRE CREW STATIONS NUMBER			200		35		73		241		549	
	(Including those at N.F. & D.R. Hdqtrs.)			229		100		85		314		728

EXHIBIT F

**INVENTORY CHANGES IN NATIONAL FOREST FIRE CONTROL IMPROVEMENTS
1933 TO 1953**

SEPARATELY FOR 2 FORESTS IN EACH REGION (R1 to R9) AND SUMMARY FOR 16 FORESTS*

ITEM		REGION 1				REGION 2				REGION 3				REGION 4				REGION 5				REGION 6				REGION 7				REGION 8				REGION 9				TOTALS (16 forests) (EXCL. R-5)*	
		KANIKSU		LEWIS-CLARK		ARAPAHO		BLACK HILLS		COCONINO		LINCOLN		PAYETTE		WASATCH		ANGELES		SHASTA		CHELAN		WILLAMETTE		CUMBERLAND		WHITE MTN.		CHEROKEE		FRANCIS M.		CLARK		SUPERIOR			
		1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953		
ROADS	MILES	93		287		(a)		(a)		403		368		477		234		425		1,776		483		370		501		247		436		205		640		122		(b) 4,866	
			1,117		425		220		1,152		2,638		979		591		244		1,267		2,112		850		824		871		571		1,603		697		528		573		13,883
TRAILS	MILES	525		1,508		(a)		(a)		105		152		3,445		962		885		2,025		2,425		3,041		0		691		803		0		0		390		(b) 14,047	
			1,865		1,854		534		0		202		356		3,103		1,065		586		1,260		2,001		2,468		70		1,358		509		0		0		479		15,864
LANDING FIELDS	NUMBER	0		0		0		0		0		0		1		0						0		0		0		0		0		0		0		0		1	
			2		2		0		0		0		0		14		0						2		3		0		0		0		1		0		0		24
TELEPHONE LINES	MILES	1,543		570		50		120		265		207		700		146						724		1,071		0		178		392		100		532		272		6,870	
			1,215		617		30		80		289		258		888		146						528		351		250		55		283		142		469		193		5,794
RADIOS	NUMBER	0		0		0		0		0		2		6		4						78		0		0		0		0		0		81		0		171	
			85		47		4		38		64		19		75		19						76		128		21		0		87		25		95		59		84
RADIO COVERAGE	SQ. MI.	0		0		0		0		0		60		100		100						1,044		0		0		0		0		0		300		0		1,604	
			2,002		1,454		100		1,400		2,200		675		1,890		478						2,507		2,500		3,000		0		1,533		632		2,450		3,755		26,576
LOOKOUTS	NUMBER	126		8		1		3		8		15		70		0						41		61		0		6		10		6		51		9		415	
			18		10		1		9		13		11		24		1						27		49		22		6		17		6		39		29		282
LOOKOUT DETECTION COVERAGE	SQ. MI.	1,801		1,076		150		200		1,500		1,500		2,531		0						2,500		2,450		0		1,300		1,533		632		2,188		2,000		21,361	
			778		1,076		150		1,000		2,600		1,800		2,531		100						1,800		2,000		1,470		1,300		1,533		632		2,188		4,200		25,158
FIRE CREW STATIONS (Including those at N.F. & D.R. Hdqtrs.)	NUMBER	15		18		10		10		7		7		22		17						30		30		0		5		7		2		17		17		214	
			17		23		8		6		5		6		22		17						35		40		9		6		7		2		10		13		226-266

* Data incomplete for Angeles and Shasta

(a) Not available

(b) Does not include mileages for R-2 forests

ADDITIONAL FIRE CONTROL IMPROVEMENTS REQUIRED
AS REPORTED SEPARATELY FOR 4 REGIONS AND 16 FORESTS IN 8 REGIONS

	<u>Roads</u>	<u>Trails</u>	<u>Landing Fields</u>	<u>Tel. Lines</u>	<u>Radios</u>	<u>Radio Coverage</u>	<u>Lookouts</u>	<u>Fire Crew Quarters</u>
Region 1	8518	1444	36	478	577	16,866	--	1
Region 2	--	--	--	--	--	40,000	--	--
Region 3	--	--	--	--	386	--	10	20
Region 5	--	--	136*	--	--	--	4	--
Total (4 Reg.)	8518	1444	172	478	963	56,866	14	21

*Plus 1095 Helispots

Kaniksu	719	88	0	68	20	200	--	1
Lewis & Clark	475	245	4	4	15	1,100	--	--
Arapaho	--	--	--	--	20	500	--	--
Black Hills	--	--	--	--	10	--	--	--
Coconino	--	--	--	--	22	600	--	1
Lincoln	--	--	--	--	32	1,350	--	--
Payette	260	57	4	10	30	1,503	16	--
Wasatch	114	132	--	10	70	922	--	--
Chelan	--	55	2	--	14	--	--	--
Willamette	44	11	--	--	12	350	--	--
Cumberland	181	--	--	--	--	--	--	--
White Mountain	--	--	--	--	--	--	--	--
Cherokee	50	--	--	--	15	--	--	--
Francis Marion	16	--	--	--	--	--	--	--
Clark	--	--	--	--	--	600	--	--
Superior	977	48	--	--	35	1,080	6	--
Total for 16 Forests in 8 Regions	2836	636	10	92	295	8,205	22	2